ARGUS 156
Manual

Version: 1.03 / **EN**

Important note:
An ARGUS basic package contains at least one VDSL or SHDSL interface, which includes a variety of functions and tests. All other interfaces and functions are available as options (see datasheet). Therefore, depending on the scope of function supplied, individual menu options may be hidden.

www.instagram.com/intec_argus

www.facebook.com/intec.argus

ARGUS testing the telecom network

https://www.linkedin.com/company/441568

1 Introduction

The handy all-rounder for SHDSL measuring

The ARGUS 156 triple-play and xDSL combi tester is a low-cost, hand-held device for all xDSL interfaces, such as G.fast, VDSL2 (super vectoring + profile 35b bonding), ADSL and SHDSL.

ARGUS 156 - the xDSL combi tester
It is the ideal entry-level meter for high-end SHDSL measuring technology and for servicing and commissioning business and backbone accesses through a combination of E1 interface (PRI) and SHDSL-TDM/ATM/EFM.

Interfaces and tests flexibly expandable
The built-in interfaces can be flexibly expanded as needed to add additional functions, for instance telephony (ISDN/POTS), copper (TDR, DMM etc.) or wireless (WLAN, LTE). Triple-play testing (Data, VoIP and IPTV) is also available as an option.

Your advantage: As a handy all-rounder with a wide range of interfaces and expansion options, the ARGUS 156 is the ideal mix of an all-in-one and single-interface tester.

Overview of key ARGUS functions:

G.fast and xDSL interfaces (ADSL, ADSL2, ADSL2+, VDSL2, VDSL2 profile 35b, G.fast)

- **Synchronisation with DSLAM (xTU-C) and determination of all relevant connection parameters and error counters**
- **Bridge, router and terminal-device modes, via IPv4 and IPv6**
- **SHDSL-DSLAM-Simulation (STU-C)**

Ethernet interfaces

- **Gigabit Ethernet test interface (10/100/1000 Base-T)**

LTE extension incl. LTE scanner and data tests

IP tests via xDSL and Ethernet

- **IP tests**
  - Ping and traceroute tests (BRAS information, PPP trace, VLAN), via IPv4 and IPv6
  - Download tests for measuring throughput (HTTP-download, FTP-up/download)
  - FTP server test, up/download from ARGUS to ARGUS
  - Parallel testing of multiple services (VoIP, IPTV, Data)
- **VoIP test**
  - VoIP terminal device simulation, including acoustics (var. codecs), via IPv4 and IPv6
  - OK/FAIL assessment of VoIP speech quality (QoS) according to:
    - MOS_{CQE} (ITU-T P.800), E-model (ITU-T G.107)
- **IPTV tests**
  - Stream request (STB mode), IPTV channel scan, IPTV passive
  - OK/FAIL assessment and display of quality parameters

ISDN functions (PRI/E1 see extra manual)

- U-interface (4B3T or 2B1Q) according to ANSI T1.601
- PRI/E1 interface according to ITU-T I.430/431 in TE and NT operation
- D-channel monitoring via BRI and PRI interface
- Testing of BRI and PRI fixed lines (E1, 2 Mbit/s)
- E1-BERT via all B-channels simultaneously (MegaBERT)
- Automatic service and service-feature tests, and much more
- Assessment of ISDN speech quality directly on BRI or U-interface

POTS functions

- Fully functional integrated analogue handset (POTS)
- With DTMF and CLIP display, pulse dialling
- High-ohm 2-wire monitor with voltage measurement
- Assessment of analogue speech quality directly at POTS access

Copper test (Cu test) functions

- **Line Scope:** High-performance realtime Line Scope with display in time and frequency range (FFT) up to 35 MHz
- **TDR:** Time domain reflectometer to measure line lengths and locate faults
- **Copper Box:** expansion of the ARGUS copper test function, see ARGUS Copper Box manual

Documentation and Analysis

- **Documentation** of all parameters recorded to test reports (in device and on PC) via automatic access tests
- Transfer of test results via **QR code** to a smartphone
- **Update Tool** to carry out FW updates for free
- **WINplus** PC software for generating, saving, archiving and printing test reports and for configuring the ARGUS®
- **WINanalyse** PC software for analysis (including WINplus) ISDN D channel clear text decoding for protocol analysis
- **WLAN** extension for transferring test results to systems of an electronic order processing system, acces point mode (browsing, download) and remote control via smartphone

Note:
Detailed explanations regarding PRI/E1 and Copper Box may be found in the separate documentation for the respective device.
You should receive these together with your equipment. You can also download the latest manuals at http://www.argus.info/en/service/downloads, or simply contact our Service Department:

intec Gesellschaft für Informationstechnik mbH
Rahmedestr. 90
D-58507 Lüdenscheid
Tel.: +49 (0) 2351 / 9070-0
Fax: +49 (0) 2351 / 9070-70
www.argus.info/en
support@argus.info

2 Safety information

ARGUS may only be operated using the accessories supplied with the device. The use of other accessories can result in faulty measurements or even damage to ARGUS and the connected equipment. Only use ARGUS according to the instructions contained in this accompanying document. Use in any other manner can cause harm to persons or destroy your ARGUS.

⚠

- Before connecting ARGUS to an access, make sure that no dangerous voltages or voltages for which ARGUS and its accessories are not specified are present. Also keep in mind that the voltage can change over the time that the device is connected.
- Use ARGUS only according to its intended purpose at all interfaces and local loops.
- Voltages over 50 V AC and 120 V DC can cause death.
- Never conduct measurements without the battery pack!
- ARGUS is not waterproof. Therefore, protect ARGUS against water penetration.
- Before replacing the battery pack, disconnect the power adapter and all measuring leads and power ARGUS down.
  ATTENTION: Never remove the battery pack during operation.
- Remove the power adapter from the mains socket as soon as ARGUS is switched off or no longer in use (e.g.after charging the battery pack)!
- ARGUS may only be used by trained personnel.
- ARGUS may only be operated using the power adapter supplied with the device.
- Only manufacturer-approved headsets may be connected to the headset socket; any other use of this socket (e.g. connection to a home entertainment system) is expressly prohibited.
- Only the Active Probe II, the ARGUS Copper Box and the other manufacturer-approved USB devices without mains connection may be connected to the USB host interface (USB-A). Any other use (e.g. connection to a PC) is expressly prohibited.
- If external USB devices are used on the USB-host interface (USB-A), no warranty is assumed for occurrences outside the mechanical wear of normal plug-in.
- In battery power mode, always cover the ARGUS power socket with the supplied rubber protective cap labelled "Power".

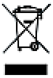
- The electromagnetic compatibility (EMC) has been tested according to the regulations specified in our conformity declaration.
  ARGUS is a class A device. This device can cause radio interference in residential areas. In this case, the user may be required to implement appropriate measures.
- Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
- The device may not be used during thunderstorms.
- If ARGUS is operated under extreme conditions, it can be set to energy-saving mode to protect the device and the user; this can interrupt the running test and drop the connection.
  To ensure dependable extended operation of ARGUS, always make sure that it is optimally protected against high temperatures.
- The device may not be opened.
- Please observe the following safety and transport information when using the lithium-ion battery pack.
- Before starting a test or synchronising on an interface, determine how you want to supply power to ARGUS (battery pack or power adapter). The car adapter is only for charging the device. When ARGUS is connected to this adapter, you should not run any tests or synchronise on a DSL interface.
- ARGUS contains extremely sensitive electronic components. Depending on the operating mode selected, an electronic discharge from the user can, in rare cases, result in impairment of device function. The user may need to restart the impaired test or function.

Return and environmentally compatible disposal

Currently applicable environmental legislation restricts the use of certain hazardous substances in electrical and electronic devices, particularly the concentration respectively use of lead (Pb), cadmium (Cd), mercury (Hg), hexavalent chromium [Cr(VI)], polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE).

We hereby affirm on the basis of the assurances, designations and documentation of our suppliers that all our ARGUS-brand measurement technology products are free of substances in concentrations, preparations or applications whose market release is prohibited pursuant to the applicable requirements of the RoHS Directive 2011/65/EU of the European Parliament and Council dated 8 June 2011. Our EAR registration number is: WEEE reg. no. DE 92829367.

Since October 2005, we have been marking all our measuring devices with this symbol, in compliance with WEEE 2002/96/EC and the corresponding German statute ElektroG:

( (DIN EN 50419).

In other words, ARGUS and its accessories, may not be disposed of as household waste. Please consult with our Service department with respect to the return of old devices.

2.1 Safety and transport information for the battery pack

Transport

The battery pack has been tested according to the UN directive(ST/SG/AC.10/11/Rev. 4, part III., subchapter 38.3). Protective functions have been implemented to guard against short-circuit, destruction and dangerous reverse currents. As the battery pack contains a lithium quantity below current thresholds, it is not subject to international regulations governing hazardous materials either as an individual part or mounted in ARGUS. When transporting multiple battery packs, however, you may also need to observe this safety information. Further information is available on request.

⚠ **Failure to observe the following danger and warning information can impair the protective functions of the battery pack. This can cause extremely high voltages and currents which can in turn result in abnormal chemical reactions, acid leaks, overheating, smoke, explosion and/or fire. Additionally, failure to observe this information can negatively impact both the performance capacity and the performance duration.**

Hazard information and warnings

1. Do not disassemble or short-circuit the battery pack.
2. Do not through the battery pack into fire or overheat it (> 60 °C).
3. The battery pack must not become wet or damp.
4. Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
   To maximise battery life, do not store the battery long-term at temperatures above +50 °C.
5. The battery pack may only be charged using the corresponding ARGUS device or an approved charger.
6. Do not puncture the battery pack with a sharp object.
7. Do not throw the battery pack or expose it to shocks.
8. Do not use battery packs that have become damaged or deformed.
9. The battery pack contacts have a specific polarity and may not be inserted in ARGUS or a charging device with reverse polarity.
10. Only connect the battery pack to the corresponding ARGUS or charger in the intended manner.
11. The battery pack may not be directly connected to electrical outputs such as power adapters, car adapters etc.
12. Only use the battery pack with ARGUS.
13. Do not attach, transport or store the battery pack together with metallic objects.
14. Do not expose the battery pack to electrostatic charges.
15. The battery pack may not be charged or discharged together with primary batteries or other battery packs.

16. If the battery pack fails to charge by the end of the charging time, it can no longer be recharged.
17. Do not expose the battery pack to excessive pressure.
18. If the battery pack emits odours or heat, becomes discoloured or deformed or otherwise appears different from normal during operation, charging or storage, immediately remove the battery pack from the device and never use it again.
19. In the event that acid leaks and comes in contact with eyes or skin, wash immediately with clean water. Do not rub. In both cases, seek medical attention immediately. Otherwise, permanent injury may occur.
20. Keep the battery pack away from children.
21. Read this manual and the corresponding safety information carefully before using the battery pack.
22. If odours, rust or other abnormalities are detected before the first use, contact intec GmbH to clarify the next steps.

3 General technical data

Device specifications

Dimensions/weight	**Inputs/outputs**
Height: 235 mm Width: 97 mm Depth: 65 mm Weight: approx. 810 g (1.79 lbs) (incl. battery pack)	- RJ-45 (BRI/PRI/E1) for BRI and PRI - RJ-45 (Line) for xDSL, G.fast, POTS, U-interface and Copper tests - Ethernet 10/100/1000 Base-T - 2x USB-A socket, USB-host interface - USB-B socket, USB client interface - Headset input
Control panel	
25 keys	
LCD display	**Temperature range**
LCD colour display with switchable background illumination 320 x 240 pixels	Temperature range for charging battery pack: 0 °C to +40 °C Operating temperature (in battery mode): -10 °C to +50 °C Operating temperature (with power/car adapter): 0 °C to +40 °C Storage temperature: -20 °C to +60 °C Humidity: up to 95 % rel. humidity, non-condensing
	Power supply
	Lithium ion battery pack with 7.2 V rated voltage (observe the safety information) or 12 V/1.5 A ARGUS power adapter
	Miscellaneous
	ARGUS user safety tested according to EN60950-1 RoHS conformity pursuant to the WEEE directive The electromagnetic compatibility (EMC) was tested according to the regulations specified in our declaration of conformity.
CE	CE marking ARGUS 156 complies with EC directives 2004/108/EC and 2009/C197/03. We will be happy to provide a detailed declaration of conformity on request

Supported standards

<table>
<tr>
<td>VDSL (Line):
ITU-T G.993.2 (VDSL2)
ITU-T G.993.5, G.vector (vectoring)
ITU-T G.998.2, G.bond (Bonding)
ITU-T G.993.2, Annex Q (Super Vectoring)
Profiles
8a, 8b, 8c, 8d, 12a, 12b, 17a, 30a, 35b
ITU-T G.998.4 (G.INP, Retransmission)</td>
<td>ISDN-BRI/PRI (BRI/PRI/E1):
ITU-T I.430
ITU-T I.431
ITU-T G.821
ITU-T X.31

ISDN U-interface (Line):
ANSI T1.601</td>
</tr>
<tr>
<td>G.fast (Line):
ITU-T G.9700/9701 (Profil 106a)</td>
<td rowspan="4">Dielectric strength:

Line:
DC: max. +200 V
AC: max. +100 V_{pp} (Copper tests only)
DC: max. +200 V (xDSL)
DC: max. +130 V (for POTS)
DC: max. +145 V (for U-interface)

BRI/PRI/E1:
DC: max. +48 V

DC voltage measurements:
- Accuracy: ±2 %</td>
</tr>
<tr>
<td>ADSL (Line):
ITU-T G.992.1, Annex A (ADSL)
ITU-T G.992.2, Annex A (G.lite)
ITU-T G.992.3, Annex A (ADSL2)
ITU-T G.992.5, Annex A (ADSL2+)
ITU-T G.992.1, Annex B (ADSL)
ITU-T G.992.3, Annex B (ADSL2)
ITU-T G.992.5, Annex B (ADSL2+)
ITU-T G.992.5, Annex J (ADSL2+)
ITU-T G.992.3, Annex L
(RE-ADSL2 via analogue)
ITU-T G.992.3, Annex L
(RE-Narrow PSD ADSL2 via POTS)
ITU-T G.992.3, Annex M (ADSL2)
ITU-T G.992.5, Annex M (ADSL2+)</td>
</tr>
<tr>
<td>SHDSL (Line):
ITU-T G.991.2, Annex A (G.SHDSL)
ITU-T G.991.2, Annex B (G.SHDSL)
ITU-T G.991.2, Annex F (G.SHDSL)
ITU-T G.991.2, Annex G (G.SHDSL)
ETSI TS 101 524 V 1.2.1 (ETSI SDSL)
ETSI TS 101 524 V 1.2.2 (E.SDSL)
IEEE 802.3.ah (EFM)
ITU-T G.994.1 (G.hs)</td>
</tr>
<tr>
<td>Ethernet (LAN):
IEEE 802.3
- 10 Base-T
- 100 Base-T
- 1000 Base-T
Autonegotiation
Auto-MDI(X)</td>
</tr>
</table>

4 Quick-start guide

Power key

- Switches on ARGUS
- Reactivation after power-down (adjustable, see page 302)
- Switches on display illumination (also possible with any other key). In battery mode, the display illumination switches off automatically after an interval that can be set in ARGUS (see page 302).
- You can open the ARGUS Manager from any point in the menu (press briefly). Return from the ARGUS Manager to the original menu.
- Switches off ARGUS (key must be held down): after an adjustable interval (e.g. after 10 minutes), ARGUS automatically shuts down in battery mode (see page 302).

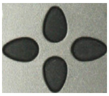
Enter key

- Opens menu
- Switches to next display
- Starts/opens test
- Accepts setting

Back key

- Switches ARGUS back to the previous display without saving current entries, e.g. changes in a configuration parameter
- Cancels tests
- Exits graphic displays
- Switches to main menu after powering up

Cursor keys



- Browses display lines page by page (vertical cursor keys)
- Cursor movement within a display line (horizontal cursor keys)
- Within selection lists or statistics, the horizontal cursor keys can be used to scroll through pages
- Select a menu, a function or a test
- Set wire types during the TDR
- Move display cursor in graphic displays
- Select functions in graphic status screen

Telephony

ISDN and POTS

- Answers and hangs up
- Simplified single call: press the handset key twice (ISDN only)

G.fast, xDSL (access mode xTU-R, xTU-R Router) and Ethernet

- Starts VoIP telephony

Level key

- Opens the graphic status screen
- BRI, PRI, U-interface access: starts single-layer measurement (level/ voltage)
- G.fast and xDSL access: displays results
- Ethernet: opens results
- Start/stop function for realtime analyses (Line Scope / TDR)

Number block

- Entry of numerals 0 through 9, letters and special characters
- Direct function call, depending on the selected access (hot key), e.g. page 311 et seq.

Softkeys

- The function of the three softkeys depends on the respective situation. The currently assigned function appears in the bottom line of the display in the form of three blue fields with white letters, e.g.:
  `<Menu>`: opens main menu
  `<Start>`: establishes a connection or starts a test

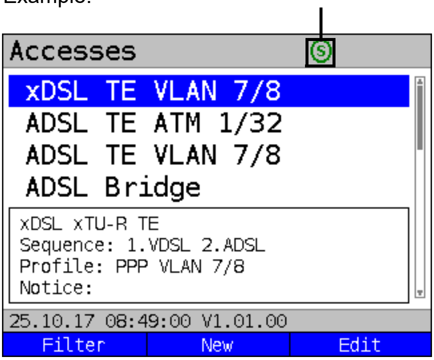
- Other softkeys are described in the corresponding chapters of this manual.

Shift key

In some menus, a green "S" in a green circle appears in the top line of the display.
In these menus, the softkeys are assigned two functions. The Shift key toggles the softkey assignment (see example page 205).

Example:

Press Shift to change the softkey assignment.



ARGUS is mainly controlled using the four cursor keys, the Enter key , the Back key , the Level key  and the three softkeys.
The bottom line of the display shows the current softkey assignments.

In the following pages of this manual, only the respective currently valid softkey function is displayed in angle brackets < > , e.g. `<Menu>`. The softkey < ✓ > performs the same function as the Enter key  .

Top connections

PWR

For external power adapter.
When the external power adapter is connected, ARGUS switches off the battery power supply.

USB-A or USB-A 1/2

USB-host interface
(Active Probe II, Copper Box, WLAN, LTE)

ARGUS checks regularly if there are any USB devices connected.

USB-B (mini-USB)

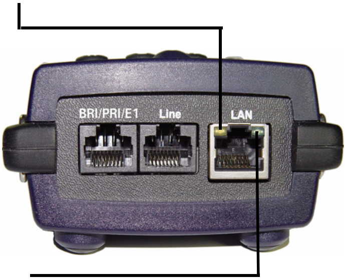
USB-client interface (PC connection)

Headset socket

Bottom connections

Yellow Link/Data LED:
signals physical connection with another Ethernet port

- LED steadily illuminated: connecting
- Flashing LED: transmitting/ receiving



The green Speed LED and yellow Link/ Data LED indicate transmission speed

- LED on: 10/100 Base-T

Green Speed LED indicates transmission speed

- LED on: 10/100/1000 Base-T

BRI/PRI/E1

Access BRI	Pin assignment: 3/6, 4/5
Access PRI	Pin assignment: 1/8, 2/7

Line

Access POTS	Pin assignment: 4/5
Access U-interface	Pin assignment: 4/5
Access G.fast	Pin assignment: 4/5
Access xDSL	Pin assignment: 4/5
SHDSL n-wire	Pin assignment: fixed 4/5 variable 3/6, 1/2, 7/8
Access Copper	Pin assignment: 4/5

LAN

Connection to a PC network card.
Connection to the Ethernet interface of an xDSL modem, router (IAD) or hub/switch or another Ethernet interface (access: Ethernet).

Charging the battery in initial operation

The battery pack compartment is on the rear of the device. Attach the battery back by placing it against the retaining points at the top end and then screwing down the knurled screw. Use only the battery pack supplied with the device. Observe the safety information given on page 14. Now connect your (switched-off) ARGUS to the external power supply supplied with the device.

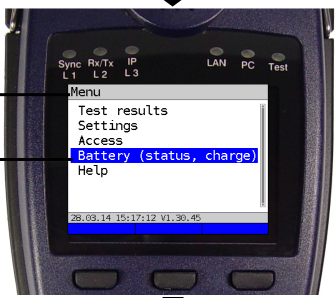
Switch on ARGUS using the key. The following display appears (you may first need to acknowledge warnings or messages with `<Continue>`):

The Accesses display can vary depending on the configuration.

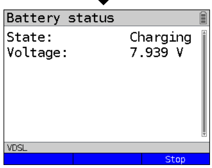
Current assignment of the softkeys.

Menu name

Selected menu option



Press



ARGUS indicates in the display when the battery is completely charged.

Press: ends charging.

You must first change the battery pack supplied with the device completely (see page 309 Status) before full capacity is reached.

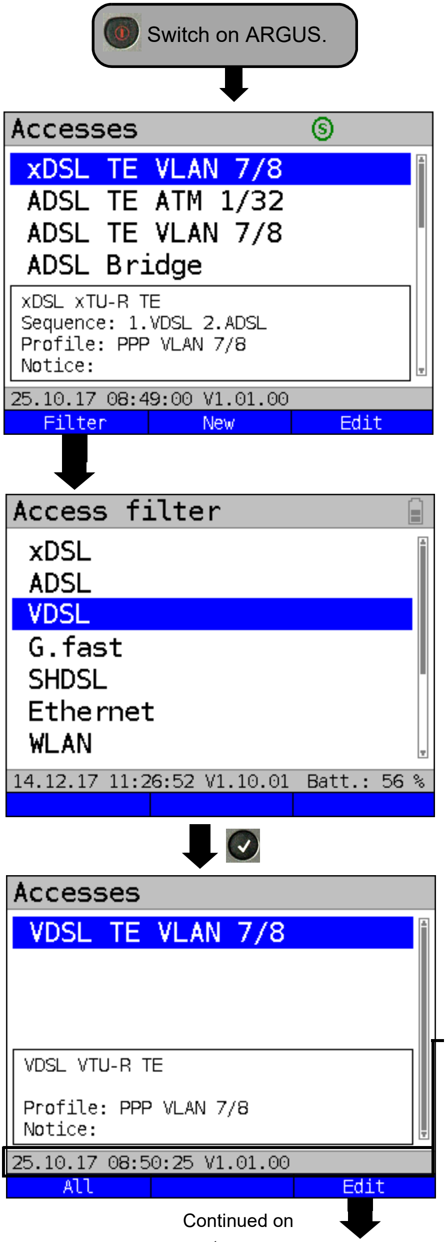
Power-saving mode

⚠ In battery mode, ARGUS automatically switches off after five minutes of no activity (interval adjustable, see page 302). ARGUS does not switch off during a test e.g. (Loopbox) or in trace mode.

The device can alternatively be operated using the supplied external adapter. When the adapter is connected, power supply via the battery is automatically switched off. ARGUS must always be operated with the battery, regardless of the power supply type. This ensures e.g. uninterrupted operation of the real-time clock.

⚠ Unplug the adapter from the mains as soon as ARGUS is switched off and no longer in use (battery charging).

5 Configuring accesses



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After powering up, ARGUS displays all configured accesses (up to 100). By default, one access is preconfigured for every interface type (ADSL, VDSL, ...). When changing accesses, the last access used is indicated on the display with ● . ARGUS additionally displays a preview of the selected access settings, see also page 30. The preview window opens after 2 seconds.

<New> Creates an access, see page 26, Fig. 2.

<Edit> Edits an access, see page 26, Fig. 1.

Shift: Toggles softkey assignment, see page 34.

Switches to main menu.

With the **<Filter>** softkey, ARGUS lets you filter all pre-configured accesses according to access type (xDSL, ADSL, VDSL, ...) and displays this group.

In this example, VDSL is selected.

All relevant accesses are displayed in which VDSL is specified in the configuration.

The status line (above the softkey) displays either the date, time, version and battery level after power-up, or the access "still" selected after changing accesses..

<All> Display of all possible accesses, see Fig. 1.

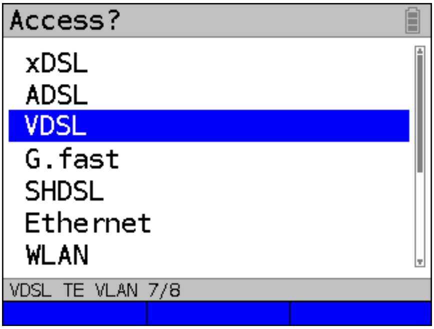
<Edit> Edits the selected access profile.

5.1 Access wizard

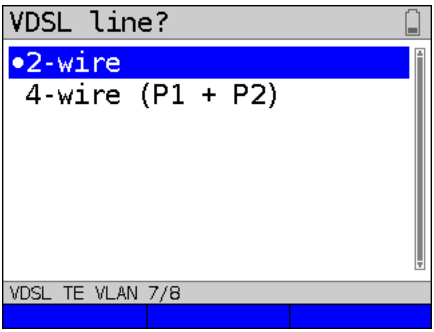
ARGUS switches to the "Accesses" main menu.

You can now configure the selected access, here VDSL TE VLAN 7/8, using the access wizard.

The query parameters of the access wizard depend on the selected access (ADSL, VDSL, ...), see page 30.

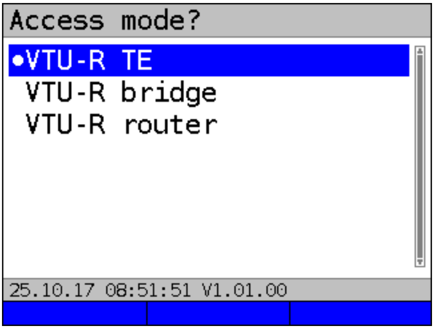


Selection of physical interface (here VDSL).
- For xDSL and G.fast, see page 41.
- For Ethernet, see page 90.
- For BRI, see BRI Manual.
- For POTS, see page 242.
- For Copper tests, see page 248 and ARGUS Copper Box Manual.



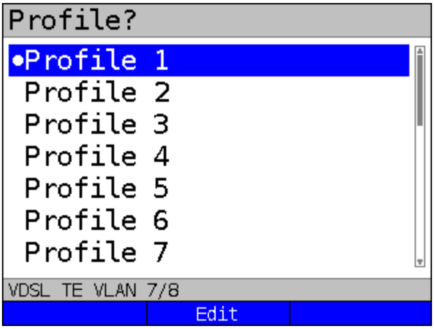
Selection of number of wire pairs.
For normal VDSL accesses, a 2-wire connection (copper twisted pair) is used, for VDSL bonding accesses, a 4-wire access is used.

Continued on next page



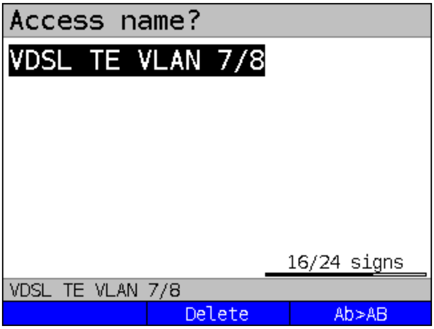
ARGUS switches directly to the access mode settings.

Selection of access mode (here VDSL VTU-R terminal) device).
- For xTU-R TE, see page 56.
- For xTU-R bridge, see page 85.
- For xTU-R router, see page 87.



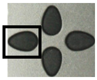
You can now link your configured access settings with one of 20 profiles. These profiles link the access settings with the access and test parameters. You can define service, virtual line and other parameters.
The selected profile is highlighted in the display in blue. The default profile is indicated with a ● in the display.

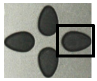
Continued on next page



Once you have selected the profile, ARGUS suggests an access name, based on the settings you made previously (here VDSL TE VLAN 7/8). You can enter up to 24 characters (in this example 16/24 characters).

<Delete> Deletes access name.

 Clears mark and returns cursor keys to the start.

 Clears mark and returns cursor keys to the end.

<Ab>AB> Entry begins with upper-case letters and continues in lower-case.

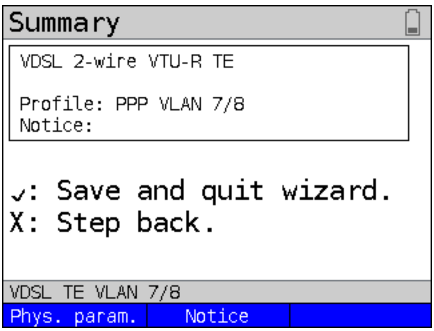
<AB>12> Entry of upper-case letters.

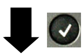
<12>ab> Entry of numbers.

<ab>AB> Entry of lower-case letters.

 Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.

 Entry of special characters e.g. _, :, +, # etc.





Continued on next page

ARGUS displays a summary of the configuration.

<Phys. param.> Edits the physical parameters, see page 43.

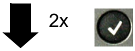
<Notice> Entry of notices, see page 37.

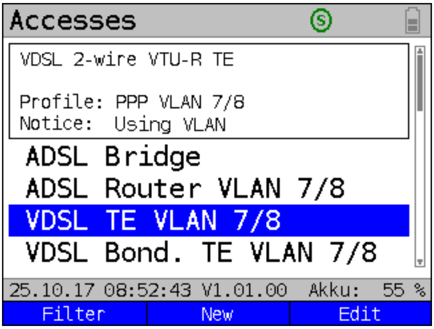
 Save and exit the wizard.

 Go back one level.

ARGUS returns to the editing overview of the selected access (here VDSL TE VLAN 7/8).
To configure the services or test parameters, select "Profile"; see also page 35.
You need to exit the access wizard before ARGUS can use the configured access.

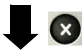

Exit the access wizard.

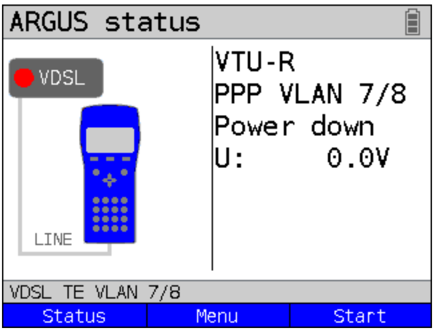

2x




Select access.

Press OK to confirm the selected access, here VDSL.





ARGUS switches to the ARGUS status display.

<Status>	Switches to status screen.
<Menu>	Switches to main menu.
<Start>	Starts the VDSL connection.

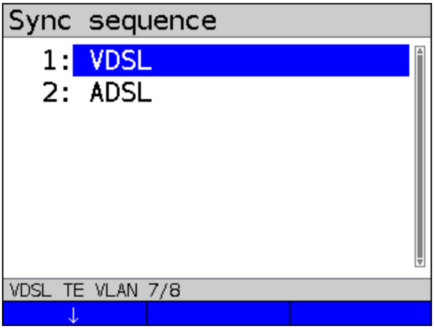
ARGUS access wizard

The access wizard prompts for different information depending on the access/interface. Each parameter queried depends on the respective previous parameters (from left to right).

Access/ interface	Sync sequence	Line (PIN, only LTE)	Mode	Access mode	L2 mode	Profile
xDSL	1. VDSL 2.ADSL	-	Annex A Annex B	xTU-R TE xTU-R bridge xTU-R router	-	Profile
ADSL	-	-	Annex A Annex B ...	ATU-R TE ATU-R bridge ATU-R router	-	Profile
VDSL	-	2-wire 4-wire (P1 + P2)	-	VTU-R TE VTU-R bridge VTU-R router	-	Profile
SHDSL	-	2-, 4-, 6, 8-wire	ATM, EFM, TDM, ITC, HDLC, ATM/EFM automatic	STU-R, STU-C, STU-C bridge STU-R bridge/ router	-	Profile
G.fast	-	-	-	FTU-R TE FTU-R bridge FTU-R router	-	Profile
Ethernet	-	-	-	IP based, Cable test	-	Profile
LTE	-	PIN	-	-	-	Profile
BRI	-	-	-	TE, NT, Leased line, Monitor	Auto.*1, P-P, P-MP	-
U-interface	-	-	-	TE, Leased line	Auto.*1, P-P, P-MP	-
PRI	-	-	-	TE, NT, Leased line, Monitor	-	-
POTS	-	-	-	Terminal, Monitor	-	-
Copper tests	-	-	-	-	-	-
*1 =only for BRI-TE, U-interface-TE						

xDSL automatic detection

For xDSL access, you are prompted for sync sequence.

	Description
	Creating a new xDSL access enables to adjust the sync sequence of VDSL and ADSL for xDSL automatic detection.  <↓> The selected access is moved down one place in the list. <↑> The selected access is moved up one place in the list.. Default: ***1. VDSL*** ***2. ADSL***

For ADSL access, you are prompted for ADSL mode:

	Description
`ADSL mode`	Different ASDL modes can be set depending on the variant. The set ADSL mode must be compatible with the ATU-C (network side). When ADSL auto-modes "Annex A/M auto, Annex B/J auto, Annex A auto, Annex B auto and Annex M auto" are selected, ARGUS automatically detects and matches the configuration on DSLAM. Default: ***Annex A/M auto***

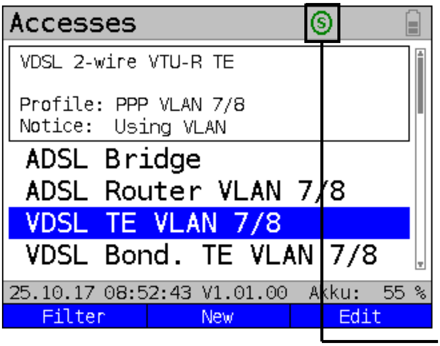
TC sublayer for SHDSL

A TC sublayer is queried for the SHDSL access. ARGUS supports the following TC (transmission convergence) sublayers:

	Description
`ATM`	Like ADSL, asynchronous transfer mode (ATM) is based on asynchronous time multiplexing. The sender and receiver can run at different clock rates so as to serve both packet-switched (IP) and circuit-switched data traffic with a single transmission technology. ATM enables this by means of an intermediate layer with cells of a fixed size (precisely 53 bytes) between the network and data link layers. These ATM cells are filled with the incoming data and prioritised with the help of the ATM adaptation layer (AAL). Data are transported in AAL5 and speech in AAL1 or 2. This ensures that speech is not delayed. Type, duration and other transmission information are stored in a 5-byte header, which reduces the payload of a cell to 48 bytes. This technology offers a range of advantages thanks to its various OAM management functions and AAL adaptation capabilities. However, this consumes an overhead. Still, this technology, which enables a bandwidth of up to 2.304 Mbit/s via a twisted pair, remains in wide use, though no longer rolled out as frequently. It is mainly used for speech and data transmission. Default: ***ATM***
`EFM`	Ethernet first mile (EFM) helps to reduce the ATM overhead and results in a higher net data rate. EFM allows Ethernet frames to be transmitted directly without being bundled in ATM cells, and is specified in IEEE 802.3ah. This process exploits the fact that the IP packets received from the network are simply passed through along the last mile and distributed to the terminal devices at the local loop. EFM forwards the Ethernet frames directly from DSLAM, without packing them in smaller ATM cells. This reduces the overhead entailed in additionally transmitting headers and in packing and unpacking the frames in ATM cells for every data exchange. As the packet-switched data portion is becoming ever greater and IP-based speech transmission (VoIP) has reached a high quality level, EFM is being increasingly expanded. The main area of application is thus in transmission of IP packages and therefore primarily data.
`TDM`	Time division multiplex (TDM) If only a single digital permanent circuit, such as an E1 access, must be replaced, TDM technology is a natural choice. This time division multiplex process enables the available bandwidth to be divided into 64 kbit timeslots, thus providing up to 36 B-channels simultaneously for telephony. This results from the maximum bandwidth of 2.304 Mbit/s that SHDSL can provide. It thus offers four B-channels more than a conventional E1 access, without the need for a complete twisted pair. The telephony quality via the B-channels is equivalent to that of ISDN. Its main area of application is thus speech transmission. TDM is still widely used.

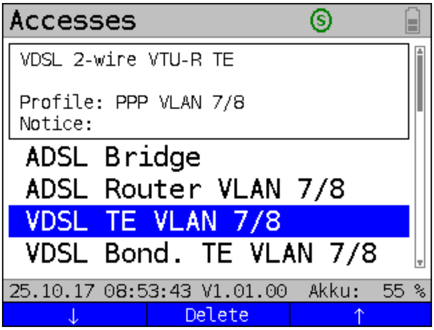
`ITC`	Independent transmission convergence (ITC) is the name of a special ARGUS mode. In this mode, ARGUS attempts to establish a synchronisation – if only briefly – independently of the TC sublayer used (ATM, EFM or TDM) by means of special commands. Its main purpose is to test whether a specific access is an SHDSL access. This mode is not intended for permanent connections or data transmission.
`HDLC`	High-level data link control (HDLC) is a unique ARGUS mode that enables synchronisation with remote stations (e.g. net-to-net type) of specific manufacturers. This mode is not intended for permanent connections or data transmission.
`ATM/ EFM auto-matic`	When ATM/EFM automatic is selected, ARGUS first establishes a 2-wire connection and then determines the TC sublayer used with the aid of the received signals. Once the TC sublayer is identified, the remaining configured wire pairs are connected.

Sorting the accesses in the access overview



Press one after another  and  Shortcut to access selection menu.

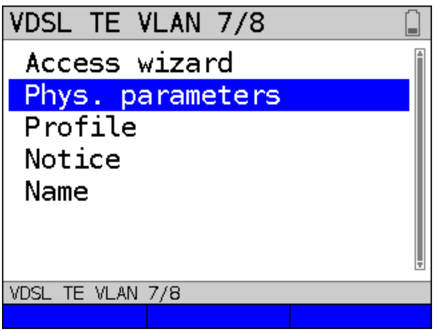
In order to keep frequently used accesses readily available, ARGUS allows you to arrange the configured accesses in any order.



Switches to softkey assignment.

`<↓>`	The selected access is moved down one place in the list.
`<↑>`	The selected access is moved up one place in the list.
`<Delete>`	Deletes the highlighted access.

5.2 Phys. parameters



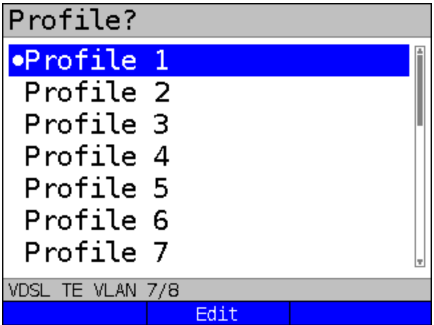
Edits the physical parameters of the selected access (here VDSL TE VLAN 7/8, see page 43).

The physical parameters can also be opened and edited directly when the access wizard is finished (see page 30 Fig. 1).

5.3 Profile

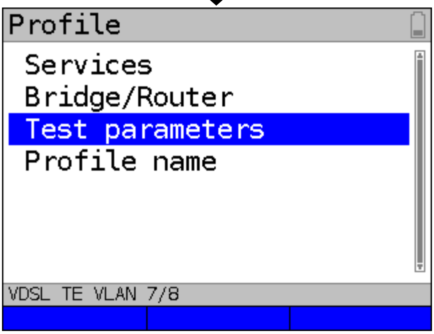
The preconfigured accesses can be linked to up to 20 profiles.
These profiles link the access settings with the access and test parameters. You can set various parameters here including those for service and virtual line.

Select a profile.



ARGUS enables configuration of up to 20 profiles.

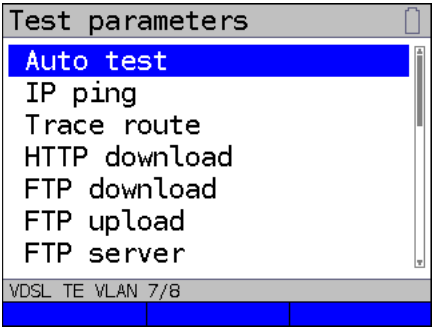
Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display.



Select e.g. Services or Test parameters.

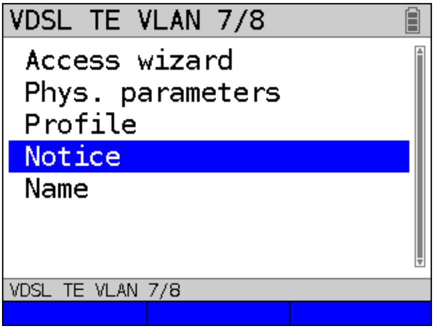
Services page 120 et seq.
Bridge/router, see page 85.
Profile name: Enter the name of the access, see page 28.

Continued on next page



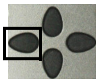
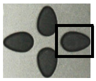
Test parameter settings are described starting on page 130.

5.4 Notices

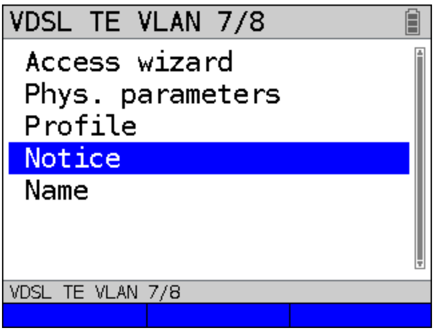


In the preview, ARGUS shows not only the selected access, the xDSL mode and the access mode but also a freely editable notice (see Fig. 1 page 37).
This note can be up to 49 characters long.

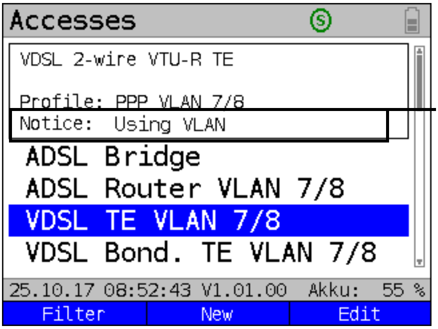
In this example, the note "Using VLAN" is selected.

<Delete>	Deletes notice.
	Clears mark and returns cursor keys to the start.
	Clears mark and returns cursor keys to the end.
<Ab>AB>	Entry begins with upper-case letters and continues in lower-case.
<AB>12>	Entry of upper-case letters.
<12>ab>	Entry of numbers.
<ab>AB>	Entry of lower-case letters.
	Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.
	Entry of special characters such as _, :, +, # etc.

Press OK to save the entered notice.



You can subsequently edit the access name as described for the access assistant, see page 28.



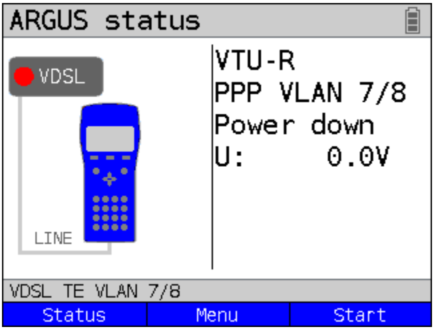
The saved notice is linked with the access and is displayed in the preview.
The preview appears approx. 2 seconds after the access is selected.

<Filter> ARGUS switches to the Filter menu, see page 25.

<New> Creates a new access.

<Edit> Edits access.

Selects access
Switches to ARGUS status, see page 30.



<Status> Switches to status screen.

<Menu> Switches to main menu.

<Start> Starts the VDSL connection.

6 Physical layer

The physical layer (layer 1) is shown in the status screen (Fig. 2) with its own graphical element (here VDSL). The other elements in the status screen are initially only named. This is explained in more detail on page 97 (Virtual Lines) and page 120 (Services).
The physical layers for the G.fast, ADSL, SHDSL and Ethernet interfaces are presented in the same way as for VDSL. The selection of the VDSL access and the access mode VTU-R are directly adopted in the status screen. If the defaults are correct, layer 1 (synchronisation on VDSL) can be established directly on `<Start>`. The most important information such as voltage (U) and modem states (power down) are displayed in the layer-1 box (blue). To change the VDSL configuration directly, press `<Edit>`. To change the access type directly in the status screen (Fig. 2), press the softkey `<Access>` or the key combination  plus .

Fig. 1

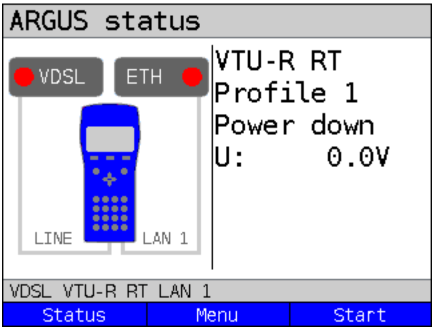
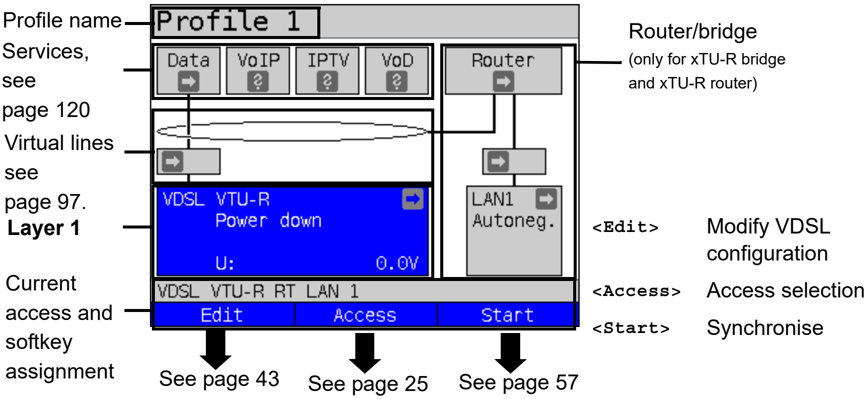


Fig. 2 (example VTU-R router):  Press Level key or `<Status>`



See page 122 for tests that can be run via layer 1.

7 Operation on G.fast and xDSL accesses

ARGUS supports G.fast and the following DSL interfaces: ADSL, VDSL, SHDSL.

ARGUS supports the following access modes:

xTU-R Terminal device mode (Fast/xDSL transceiver unit) see page 56.
ARGUS is connected to the xDSL access (in front of or behind the splitter). ARGUS replaces the modem and PC.

xTU-R bridge Bridge mode (Fast/xDSL transceiver unit bridge) see page 85.
ARGUS is connected to the xDSL access and the PC.
ARGUS replaces the xDSL modem (for SHDSL only ATM and EFM).

xTU-R router Router mode (Fast/xDSL transceiver unit router) see page 87.
ARGUS is connected to the xDSL access and the PC.
ARGUS replaces the xDSL modem and router (for SHDSL only ATM and EFM).

STU-C (STU-C: SHDSL Transceiver Unit-Central Office).
ARGUS simulates the central office side (DSLAM).

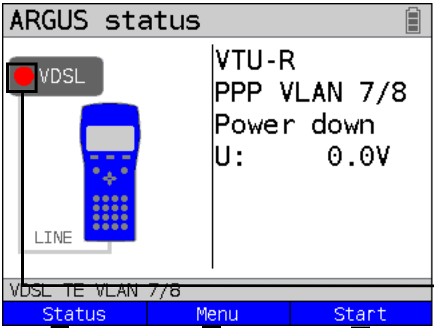
⚠ The individual DSL tests record and store data (e.g. traces of IP data). It is the user's responsibility to comply with the applicable legal requirements.

⚠ The line may not carry a DC voltage greater than 200 V DC and should be free of AC voltage components.

⚠ In principle, the operating temperature range set out in "Technical data" (see page 16). For ambient temperatures just below +50 °C, extended operation in high-performance modes can trigger the temperature dependent ARGUS protection functions described in the safety information (see page 11).

7.1 Configuring the G.fast and xDSL interface

Status screen



Display (from top to bottom)

- Access mode (in this example: VTU-R)
- Previous profile (in this example: profile 1)
- Modem state (in this example: power down)
- DC voltage on the interface

VDSL test not yet started:

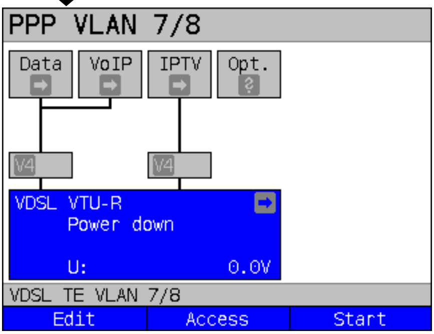
Meaning of LED image in display:

Red LED:	No test started
Yellow LED:	Test started
Green LED:	Connected
<Menu>	Switches to main menu, see menu tree
<Status>	Switches to status screen

see page 57

Main menu, see menu tree

Status screen:



ARGUS status screen:
Layer-1 box (blue in display) selected.

<Edit> Opens settings

Note: accessing functions via number keys/key combinations
You can call important functions/tests directly using the keys of the ARGUS keypad. You can find an overview of these key combinations on page 122.

7.2 G.fast and xDSL settings

ARGUS stores all relevant settings (e.g. set and limit values) for a test with the accesses. Only the relevant settings are applied, depending on the test situation. You can restore the default settings at any time (see page 305):

Setting	Description	
`Phys. parameters:`		
`ADSL:`		
`Rated / threshold value`	Setting Bitrate	Entry of the comparison value for the upstream and downstream ATM bitrate [kbit/s] using the number keys. ARGUS displays a large green "OK" in the ARGUS status screen if the current bitrate is above the set value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Default: ***d: 0*** and ***u: 0***
	CRC limit value	Sets the max. CRC (cyclic redundancy check) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:* *** and ***near:* *** (*=off)
	FEC limit value	Determines the maximum FEC (forward error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:* *** and ***near:* *** (*=off)
	HEC limit value	Determines the maximum HEC (header error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far:* *** and ***near:* *** (*=off)

<table>
<tr><td>INP/SNRM</td><td>Determines whether preference is to be given to INP (inpulse noise protection) or SNRM (signal-to-noise- ratio margin) when an ADSL connection is established.
Default: Favour DS SNRM</td></tr>
<tr><td rowspan="2">Retrans-
mission
(G.INP)

⚠</td><td>When retransmission (G.INP, G.998.4) is used, the downstream of ADSL links is protected against pulse noise on layer 1. Delays and packet losses are minimised; however, this increases the interleave delay for downstream.
Default: Down- & upstream</td></tr>
<tr><td>

When Retransmission (G.INP) is active, ARGUS shows in the status line a „R“ for Retransmission.


When Retransmission (G.INP) is unlocked but not active, ARGUS shows in the status line a „R“ for Retransmission.</td></tr>
</table>

`MAC address (line)`
`(not available using the access wizard)`

Display and selection of the line MAC addresses.
The first two MAC addresses cannot be manually edited.

1. When the standard MAC address is selected, ARGUS uses its own MAC address.
   Default: ***Standard MAC address***
2. When you select the dynamic MAC address, a different MAC address is used each time the device synchronises.
3. You can enter a third MAC address:
   Mark the line and then press **<Edit>**.

<Edit>	Entry of new MAC address. The address is entered in hexadecimal form using the number keys and key combinations: *1=A, *2=B,*3=C, *4=D, *5=E, *6=F and confirmed with ✓. No group MAC addresses may be used. Default: ***00:00:00:00:00:00***
✓	Accepting the address. The new address is temporarily saved, and is no longer available after powering down.
Press one after another * and 1	Display of ARGUS MAC addresses: Line, LAN, ETH, see also page 311 and following.

⚠ The setting “Dynamic MAC address” is active across all interfaces. For instance, if the setting for ADSL is changed, this also affects the MAC address for VDSL, SHDSL or Ethernet. Dynamic MAC addresses are used here as well. The setting “Dynamic MAC address” is saved.

⚠ Every service (see page 120) is connected to the physical layer (see page 40) via its own virtual line (see page 97) uses its own MAC address. If the setting “Standard MAC address” is used, this is made up as follows:
Voreinstellung: ***00:12:A8:EX:XX:XX***

⚠ The first three blocks (00:12:A8) do not change, as these stand for intec GmbH. The fourth block (EX) changes depending on the selected interface and service, provided that this uses its own virtual line. The final two blocks (XX:XX) depend on the device type and serial number.

00:12:A8:E0:XX:XX	Data service via Ethernet interface.
00:12:A8:E1:XX:XX	Data service via G.fast or a xDSL interface (ADSL, VDSL, SHDSL).

	00:12:A8:E3:XX:XX	VoIP service via Ethernet or G.fast/xDSL interface.
	00:12:A8:E4:XX:XX	IPTV service via Ethernet or G.fast/xDSL interface.
	00:12:A8:E5:XX:XX	Opt. service via Ethernet or G.fast/xDSL interface.
Gratuitous ARP	Determines whether Gratuitous ARP (Address Resolution Protocol) is to be used. When this is set to “on“, ARGUS transmits one ARP message every 60 seconds unrequested to communicate its MAC address. Default: ***Off***	
VDSL:		
Rated / threshold value	Setting bitrate	Entry of the comparison value for the upstream and downstream bitrate [kbit/s] using the number keys. ARGUS displays a large green "OK" in the ARGUS status screen if the current bitrate is above the set value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Default: ***d: 0*** and ***u: 0***
	CRC limit value	Sets the max. CRC (cyclic redundancy check) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far: **** and ***near: **** (*=off)
	FEC limit value	Determines the maximum FEC (forward error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active DSL connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far: **** and ***near: **** (*=off)
Firmware	Selects the firmware (FW) in the VDSL chipset. You can choose between version A, version B and version C. Further information is available on request. Default: ***A***	

Carrier set	The carrier set determines the carrier frequencies that ARGUS uses to signal to DSLAM that it is ready to synchronise (ITU G.997.1). The carrier generally specifies which sets are to be used. You can select the following sets with corresponding upstream tones (interval between tones 4.3125 kHz) in ARGUS: - A43, tones: 9, 17, 25 - B43, tones: 37, 45, 53 - V43, tones: 944, 972, 999 Default: ***A43, B43, V43*** When multiple sets are selected, ARGUS cyclically transmits the tones of the selected sets in parallel.
Vectoring mode	Vectoring mode defines how ARGUS behaves when synchronising with DSLAM: - Non-vectoring (off) This is standard VDSL2 with non-vectoring-capable DSL access multiplexers (DSLAMs) and modems. However, it can also be used for mixed operation with non-vectoring-capable modems on vectoring-capable DSLAMs. In such a case, the simulated modem is throttled to the ADSL2+ bandwidth (max. 16 Mbit/s). - Full vectoring Full vectoring operation requires vectoring-capable DSLAMs and modems. VDSL2 vectoring is supported when this technology is present at both ends of the bundle. Default: ***Full vectoring***
Retrans-mission (G.INP)	When retransmission (G.INP, G.998.4) is used, the downstream of VDSL2 links is protected against pulse noise on layer 1. Delays and packet losses are minimised; however, this increases the interleave delay for downstream. Default: ***Down- & upstream***
⚠	 When VDSL Vectoring or Retransmission (G.INP) are active, ARGUS shows in the status line a blue highlighted „V“ for Vectoring or „R“ for Retransmission. A flashing „R“ signals that retransmissions are occuring.  When VDSL Vectoring or Retransmission (G.INP=) are unlocked but not active, ARGUS shows in the status line a grey highlighted „V“ for Vectoring and „R“ for Retransmission.

Suppress profile 30a	Determines whether profile 30a is to be suppressed or not. Default: ***No***	
MAC address, see page 45.		
Gratuitous ARP	Determines whether Gratuitous ARP (Address Resolution Protocol) is to be used. When this is set to “on“, ARGUS transmits one ARP message every 60 seconds unrequested to communicate its MAC address. Default: ***Off***	
G.fast:		
Rated / threshold value	Setting bitrate	Entry of the comparison value for the upstream and downstream bitrate [kbit/s] using the number keys. ARGUS displays a large green "OK" in the ARGUS status screen if the current bitrate is above the set value for an active G.fast connection and an "OK" for connection parameters below the target, otherwise "NOK". Default: ***d: 0*** and ***u: 0***
	CRC limit value	Sets the max. CRC (cyclic redundancy check) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active G.fast connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far: **** and ***near: **** (*=off)
	FEC limit value	Determines the maximum FEC (forward error correction) value. ARGUS displays a large green "OK" in the ARGUS status screen if the current value is below the set limit value for an active G.fast connection and an "OK" for connection parameters below the target, otherwise "NOK". Range: 0 to 999,999,999 Default: ***far: **** and ***near: **** (*=off)
MAC address, see page 45.		

SHDSL:	
Spectrum	For region 1 (e.g. North America): Annex A/F Auto, Annex A SHDSL, Annex F SHDSL.bis (5.7 Mbit/s) For region 2 (e.g. Europe): Annex B/G Auto, Annex B SHDSL, Annex G SHDSL.bis (5.7 Mbit/s) Automatic selection of modulation modes: - TC-PAM 16 (SHDSL) - TC-PAM 32 (SHDSL.bis) Default: ***Annex B/G auto***
Clock/ framing (not for ATM + EFM)	The timing relates to the receiving and transmitting directions of a connection. The reception and transmission timing are identical for synchronous timing and different for plesiochronous timing. Timing differences are compensated by means of bit stuffing. - Synchronous - Plesiochronous (for TDM only) - Plesiochronous (NTR) (for TDM only) (the SHDSL timing is derived from the network timing reference) Default: ***plesiochronous***
Channel selection (not for ATM + EFM)	Selection of the B and Z channels via the number keys. You can select up to 36 B channels and up to 7 Z channels. When you enter * (for the B and Z channels), ARGUS automatically detects the channel allocation. Maximum selection: 36 B channels and 1 Z channel 35 B channels and 7 Z channels Minimum selection: - 3 B channels - 0 Z channels Default: **** (automatic)*** If an auto mode is selected under Spectrum (see page 49), channel selection is also automatic regardless of the settings made here.
Data rate (only for ATM + EFM)	Sets the data rate in kbit/s For SHDSL - Range: 192 kbit/s to 2.3 Mbit/s - Default: **** (automatic)*** For SHDSL.bis (ESHDSL): - Range: 768 kbit/s to 5.7 Mbit/s - Default: **** (automatic)*** If an auto mode is selected under Spectrum (see page 49), data rate selection is also automatic regardless of the settings made here.

`Power back off`	Reduces the transmitting power of the remote station. The set value corresponds to the maximum transmitting power. Range: 0 dB to 30 dB Default: ***0 dB***
`EOC usage`	The embedded operations channel (EOC) is used to exchange connection-related and other information. off: No queries or responses are sent to the remote station. on (passive): No parameters are displayed at the remote station, as only queries are responded to. on (active): The own performance parameters and those of the remote station are displayed, provided that the remote station also supports own queries. Default: ***on (passive)***
`Sync word`	The sync word identifies the SHDSL frame. (cf. ITU-T G.991.2 Chapter: PMS-TC layer functional characteristics). To enter the sync word, use the number keys and key combinations *1=A, *2=B,*3=C, *4=D, *5=E, *6=F and then confirm with  . Default: ***3F 16 1F 03 3C 0C***
`Message mode`	Selects the message mode. The message mode determines initiation of the handshake on the STU-R side resp. the response on the part of the STU-C (cf. ITU-T G.994.1 Chapter: Transactions, entry in the capability list). Range: GHS Mode A to GHS Mode D Default: ***GHS mode C***
`Vendor info field`	Entry of vendor information in the corresponding transmission field. This information is entered in hexadecimal form, see "Sync word". Default: ***15 35***

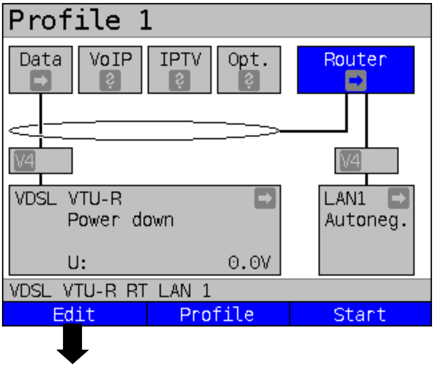
<table>
<tr>
<td>Wire pairs</td>
<td>For 2-wire SHDSL, ARGUS always uses the wire pair 4/5 (line 1); for SHDSL n-wire, ARGUS always uses the wire pair 4/5 (line 1) plus a further wire pair (line) from the list.
You can change the order of the wire pairs.
- 2nd wire pair (line 2) for 4-wire
- 3rd wire pair (line 3) for 6-wire
- 4th wire pair (line 4) for 8-wire
Wire pair 4/5 (line 1) is always reserved as the master.

You can mark the 2nd, 3rd and 4th wire pairs (lines 2-4) and move them down one slot the list using the left softkey <↓> or up one slot in the list using the right softkey <↑>. Confirm your entry with .
The following default is common:
Line 1: wire pair 4-5 (fixed)
Line 2: wire pair 3-6
Line 3: wire pair 1-2
Line 4: wire pair 7-8</td>
</tr>
<tr>
<td>Line probing (PMMS)</td>
<td>When a connection is being established, line probing (power measurement modulation session) can occur; this is standardised according to ITU-T G.991.2. This function enables determination of a variety of line parameters to identify the possible data rate before the actual synchronisation process with the remote station.
<table>
<tr><td>Rate-adaptive mode</td><td>This determines what interference is taken into account in the PMM session.
- Current SNR DS: current line interference in down stream is taken into account.
- Worst case G.991.2 SNR DS: reference line interference from G.991.2 in downstream is taken into account.
- Current SNR US: current line interference in upstream is taken into account.
- Worst case G.991.2 SNR US: reference line interference from G.991.2in upstream is taken into account.
Default: none</td></tr>
<tr><td><Add></td><td>A display with the available modes opens. Any mode marked with in this window is inserted in the list (above the mode marked in the list).</td></tr>
</table>
</td>
</tr>
</table>

	<Delete>	Deletes the marked mode from the list
		Adopts the mode priorities.
	Targets SNRm in dB	Destination SNR margins can be set for the above line interference. - Current up: 0 - Current down: 0 - Worst-case up: 0 - Worst-case down: 0 Range: -10 dB to 21 dB Default: ***zero for all***
Interopbits	Line probing	The PMM session supports the following remote stations: - G.991.2 - Globespan Default: ***G.991.2***
	Multiwire (only for ATM + TDM)	The synchronisation behaviour is matched to the following remote stations: - Auto (automatic) - Globespan - G.991.2 Default: ***Auto***

	EFM	Aggregation	Select this setting when ARGUS in STU-C mode and the modem in STU-R mode do not support the discovery operation of the expanded G.hs according to IEEE 802.3ah section 4.
		Discovery and agg.	Select this setting when the discovery operation of the expanded G.hs according to IEEE 802.3ah section 4 is supported.
		Default: ***Discovery and agg.***	
	SRU (EFM and Independent ITC only)	Supports the regeneration unit (SRU) functions of the following remote stations: - Off - Elcon Coco10M (only EFM) - Elcon International (only EFM) - Albis BSRU (only for 4-wire Independent TC) Default: ***Off***	
	EOC error counter	Depending on the setting here, errors are transmitted using the EOC, summed by ARGUS ("absolute") and displayed or determined over the corresponding request interval ("delta") and displayed. Default: ***Absolute***	
	QD2Lite	Determines wheter the protocol uses QD2Lite in EO channel or not. Default: ***off***	
MAC address, see page 45.			

Status screen:



ARGUS in Status screen, in this example VDSL router mode is selected.

`<Edit>` Open settings

Profiles (<Edit> edit profiles)	
Bridge/Router	
IP version (Bridge + Router)	Determines which IP version is to be used. IPv4: Internet Protocol version 4 acc. to RFC 791 IPv6: Internet Protocol version 6 acc. to RFC 2460 Dual Stack IPv4/IPv6: If IPv6 is available, this protocol is preferred; if not, ARGUS switches to IPv4. Default: ***IPv4***
IPv4 (Bridge + Router)	Definition of IP address assignment IP mode: Static IP: Fixed IP address DHCP server: Assignment of IP address by ARGUS Default: ***DHCP server*** Own IP Address: Range: Range 0.0.0.0. to 255.255.255.255 Default: ***192.168.10.1*** (assignment see RFC 3330) IP netmask: Range: Range 0.0.0.0. to 255.255.255.255 Default: ***255.255.255.0*** (assignment see RFC 3330) DHCP server: (Bridge + Router) Settings for the DHCP server: - Starting and ending IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.10.30*** End: ***192.168.10.40*** Domain name - Duration of reservation for IP addresses Range: 1 - 99999 seconds Default: ***240***

	NAT (only Router)	NAT (network address translation) on or off. The NAT service automatically and transparently replaces address information (e.g. IP addresses of the LAN) with other address information (e.g. IP addresses of the WAN). Default: ***NAT on***
	SIP port (only Router)	Port used for incoming SIP signalling. Range: 0 to 65535 Default: ***5060***
`IPv6 (only Router)`	Firewall	Determines whether ARGUS uses a firewall in router mode. Default: ***on***
	Discard prefix	Specifies whether ARGUS rejects or uses the address prefix (first 64 bits of the IPv6 address, customer/provider-specific). Default: ***on***
`VLAN (only Bridge)`	VLAN handling	When VLAN tagging is used, a VLAN tag is attached to every outgoing Ethernet frame (from the WAN). The tag is removed from every incoming Ethernet frame. In transparent VLAN, the Ethernet frames are passed on unchanged. Default: ***Transparent***
	VLAN ID	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***
`Data log (Bridge + Router)`	Data log on or off This function must be set to "on" so that a trace file can be sent to the PC; see page 82. After terminating a virtual line (VL) via the corresponding service or the physical layer, ARGUS queries whether the trace file should be sent to the PC. The mini-USB port must also be connected to the PC. For example, when the data log is activated for VL 1, only VL 1 is recorded. When one VL is configured for multiple services and the data log is active, all data of this VL are recorded. Default: ***off***	

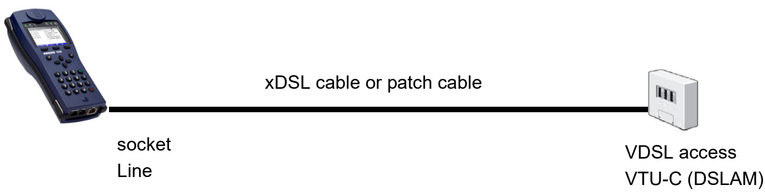
See chapter „9.4 Virtual line settings“ (see page 107) for further configurations.

7.3 ARGUS in access mode xTU-R

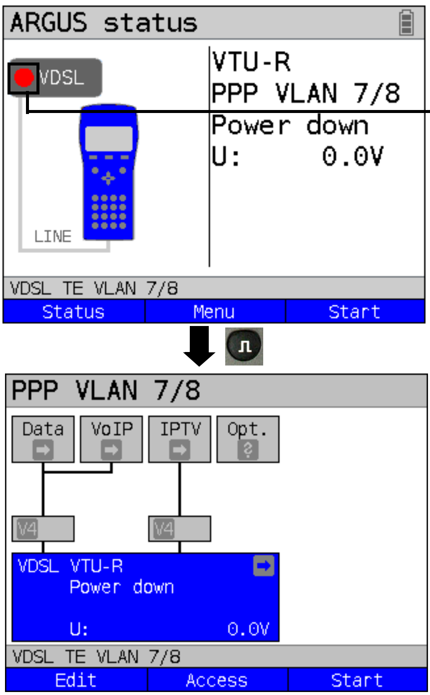
Determining the G.fast and xDSL connection parameters using VDSL as an example (procedures also apply for ADSL and SHDSL connections)

ARGUS is connected directly to the VDSL access via the supplied xDSL lead and the ARGUS socket line (either in front of or behind the splitter). In this case, ARGUS replaces the modem and PC. ARGUS establishes a VDSL connection and determines all relevant VDSL connection parameters. ARGUS displays the VDSL connection parameters and, if desired, saves them when the link is disconnected.

⚠ **Use only the patch cable supplied with the device.**



In this example, VDSL VTU-R mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).



The VDSL test has not yet been started: red LED in the display!

Meaning of LED image in display:

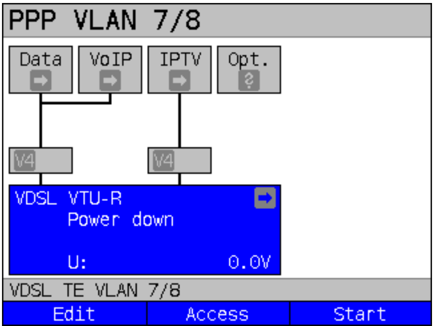
Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

⚠ All further functions and procedures are explained using this status screen.

Establishing the G.fast and xDSL connection using VDSL as an example

Profile configuration:

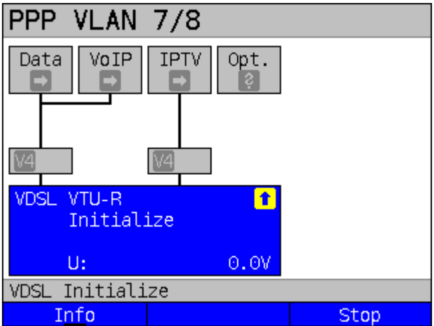
ARGUS uses the settings (see page 31) and limit values (see page 43) stored in the respective profile for establishing a VDSL connection.



ARGUS in status screen.

ARGUS uses the default profile (PPP VLAN 7/8 in the example) to establish the VDSL connection.

`<Edit>`	Edits the VDSL settings and MAC address.
`<Access>`	Selects a new access.

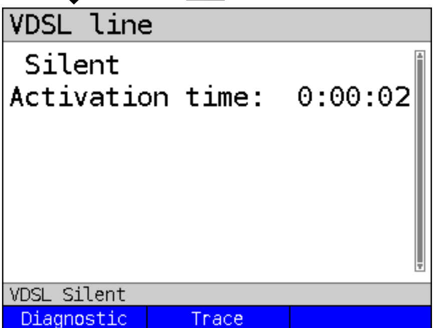


Establishing a VDSL connection

ARGUS synchronises with DSLAM (LED "Sync/L1" flashes, display shows element on yellow background).

ARGUS displays the current connection status (in this example "Initialize") in the layer-1 box (blue).

or 



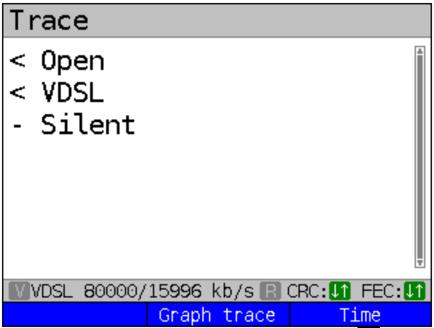
While connecting:

Display:

- Current connection status
- Time elapsed since start of synchronisation in h:min:s.

`<Diagnostic>`	This function is available on request.

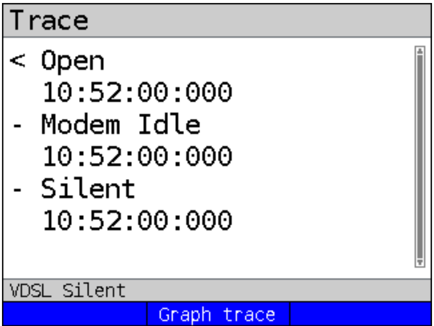
Continued on next page



Display of commands

<	= Command sent by ARGUS
>	= Command sent by DSLAM
-	= Connection status

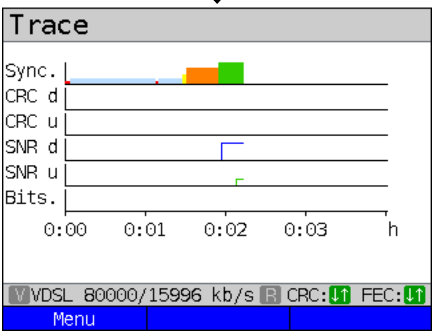
Display timestamp



ARGUS shows the time (internal clock, see page 301) at which the commands are received.

Switches to the previous display and the status screen.

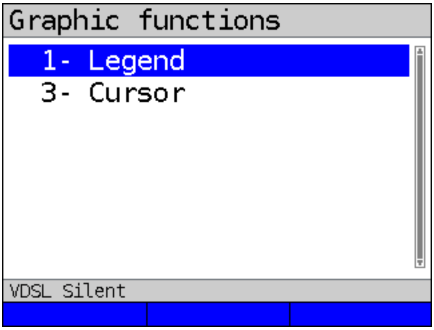
Display the graphical xDSL trace.



Display:

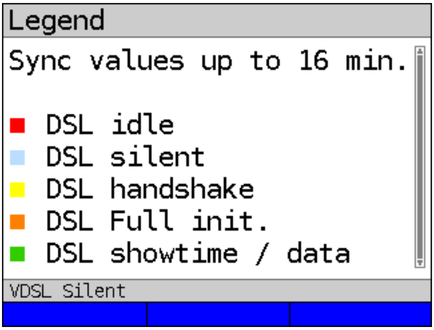
- Synchronising
- CRC error in downstream
- CRC error in upstream (ADSL/VDSL only)
- SNR in downstream
- SNR in upstream (ADSL/VDSL only)
- Bitswap events (ADSL/VDSL only)

See page 60 for an explanation of the colour code.



You can show and hide the label for the xDSL trace using the number key.

The function of the cursor is described on page 64.



The colour code in the xDSL trace can be interpreted as follows.

Legend and explanations:

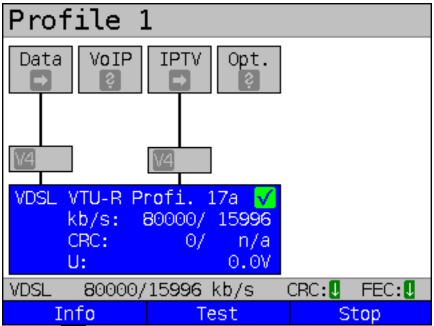
Recording time	Resolution	Leap factor
16 min.	1 sec.	-
32 min.	2 sec.	2
64 min. (1 h 4 min.)	4 sec.	2
128 min. (2 h 8 min.)	8 sec.	2
256 min. (4 h 16 min.)	16 sec.	2
512 min. (8 h 32 min.)	32 sec.	2
1024 min. (17 h 4 min.)	64 sec. (1 min. 4sec.)	2
2048 min. (1 d 10 h 8 min.)	128 sec. (2 min. 8 sec.)	2
4096 min. (2d 20 h 16 min.)	256 sec. (4 min. 16 sec.)	2
8192 min. (5 d 16 h 32 min.)	512 sec. (8 min. 32 sec.)	2

Meaning of the modem states:

Colour	Short form	Explanation
red	■ DSL Idle	No-load
light blue	■ DSL Silent	ARGUS transmits handshake tones (silence on the DSLAM side).
yellow	■ DSL Handshake	A handshake (G.hs) signal from the remote station was detected.
orange	■ DSL Full init.	Start of the training phase following successful handshake.
green	■ DSL Showtime / Data	Showtime achieved. The TC sublayer is established. ARGUS is ready for operation.

Connected

As soon as the connection is established, (LED "Sync/L1" continuously illuminated and green tick mark in layer 1 box), ARGUS determines the VDSL connection parameters. After synchronising, ARGUS must remain connected to the VDSL access for at least 20 seconds. Only then can ARGUS save all VDSL connection parameters.



ARGUS in status screen.

Display (layer-1 box)

- Access and access mode
- VDSL profile (8,12,17,30 or 35 MHz)
- d: Downstream data rate
  u: Upstream data rate
- Number of CRC errors in downstream/upstream
- DC voltage at interface

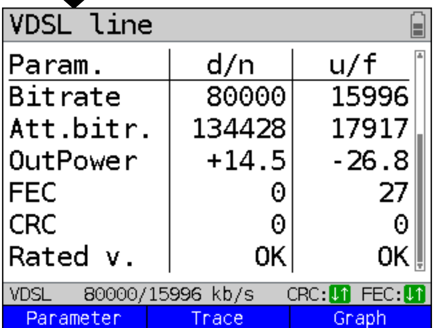
<Info> Displays the VDSL connection parameters.

<Stop> Disconnects the VDSL connection.

or 

Signals of CRC/FEC error counters:

Symbol	Colours left and right	Explanations
	green / green	No CRC errors occurred in the final second.
	red / red	In the final second, FEC errors occurred in both upstream and downstream.
	green / red	No upstream CRC errors occurred in the final second.
	red / green	In the final second, FEC errors occurred in downstream only.



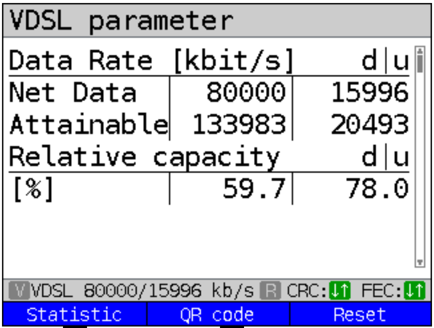
Display of VDSL connection parameters in overview:
- d/n: downstream/near
- u/f: upstream/far

Browse connection parameters

<Trace> Displays trace data, see page 58.

<Graph> Displays the graph, see page 63.

Continued on next page



Displays the connection parameters in long form for downstream (d) and upstream (u), see table page 70.

n/a	not available
n/u	not used
n/r	not received

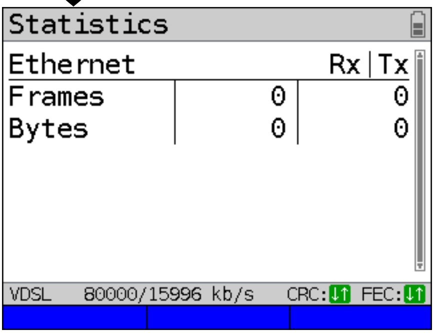
Browse parameter display

<Reset> Resets the error counters.

Generates QR code.

Display of xDSL parameters as QR code.

Exits the QR code menu.



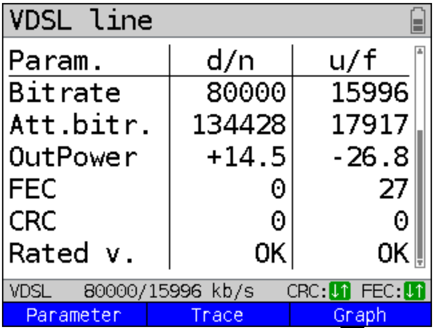
Continued on next page

G.fast and VDSL (EFM) - Ethernet statistics

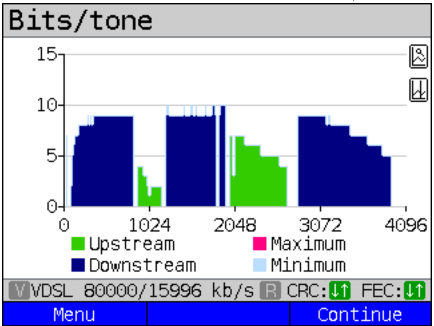
Frames	Displays the received (Rx) and transmitted (Tx) Ethernet frames.
Bytes	Displays the received (Rx) and transmitted (Tx) Ethernet bytes.

SHDSL ATM statistics

ATM cells	Number of ATM cells.
OAM cells	Number of OAM cells.
User VCCs	Number of user-side VCCs
AAL5 PDUs	Number of AAL5 PDUs
Unmapped cells	Unmapped cells received (Rx)
Unmapped VPI/VCI	Unmapped VPI and VPI received (Rx)



The following graphs and graph functions are only available for G.fast, ADSL and VDSL.

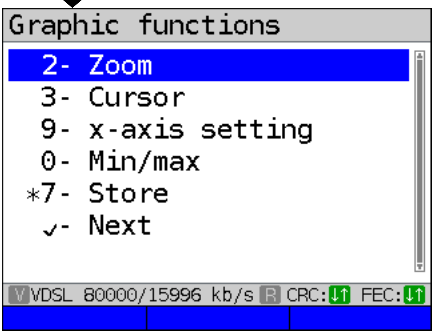


Displays the bit distribution
i.e. transported bits per tone (channel)
y-axis: bits
x-axis: tones (channels)
Line interference sources can be identified on the basis of the bit distribution
(e.g. due to HDSL, RF, DPBO etc.).

ARGUS switches to the previous display.

`<Continue>` Switches to next graph.

See page 68



Continued on next page

Graph functions:
The graph functions such as zoom, cursor and setting of the x-axis enable detailed analysis of the graphs:

Exits the menu without changing.

You can also use this number key to toggle the zoom function within a graph.

The function of the cursor is described on page 65.

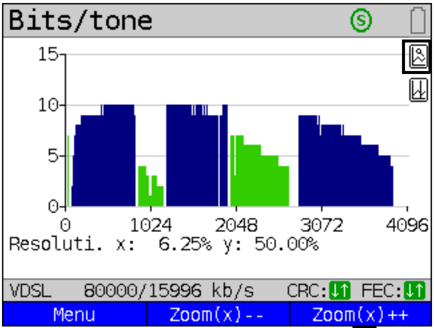
Toggles the x-axis from tone to frequency is described on page 66.

Toggles the min/max is described on page 66.

Switches automatically to the next graph with the view and adopts all settings for this graph.

and

Saves the result without disconnecting the connection.

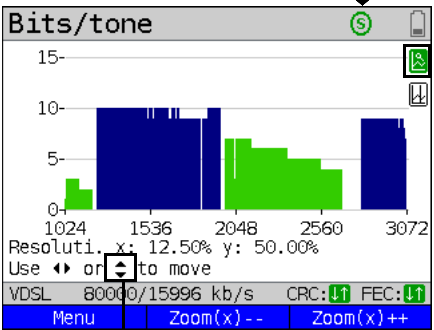


The magnifying glass shown in the display rests on a white background.

It has not yet been zoomed.

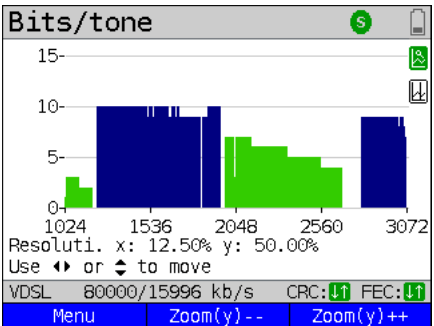
`<Zoom(x)++>` Magnifies the middle section of the graph (100%).

`<Zoom(x)-->` Reverses `<Zoom(x)++>` and resets magnification.



The magnifying glass shown in the display rests on a dark background, indicating that it has been zoomed.

Use the cursor keys to horizontally scroll through the zoomed range.



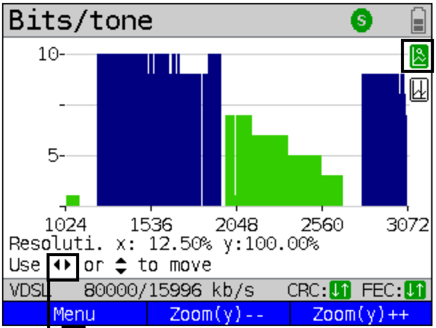
toggles the softkey assignment.

ARGUS switches from x-axis zoom to y-axis zoom

`<Zoom(x)++>` Magnifies the middle section of the graph (100%).

`<Zoom(y)-->` Reverses `<Zoom(y)++>` and resets magnification.

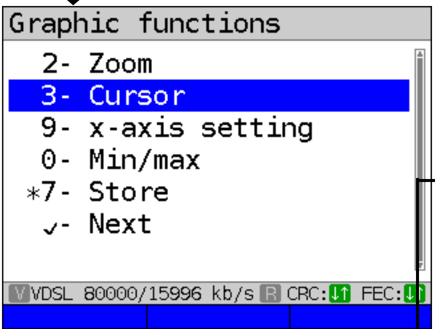
Continued on next page



The magnifying glass shown in the display rests on a dark background, indicating that it has been zoomed.

You can use the cursor keys to scroll vertically through the zoomed range.

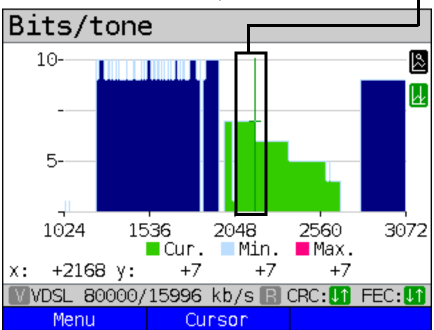
Activates the cursor directly.



The cursor functions enables precise determinations on the graphs.

When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.



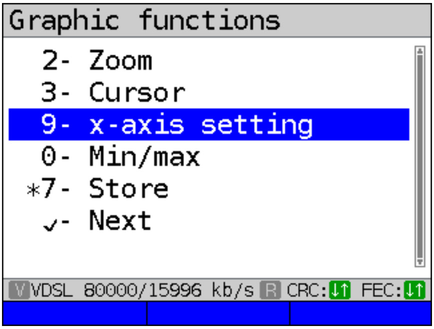
The values of the graph for the position under the cursor are displayed in the graph as follows:

x: 2168. Tone

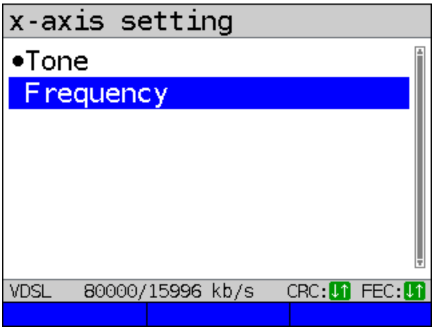
y: 7 bits

Use the left and right cursor keys to move the cursor to any point on the graph to measure it. Briefly pressing a cursor key causes the cursor to jump to by one position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

Continued on next page



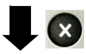
By toggling the x-axis you can change its labelling from tone to frequency.

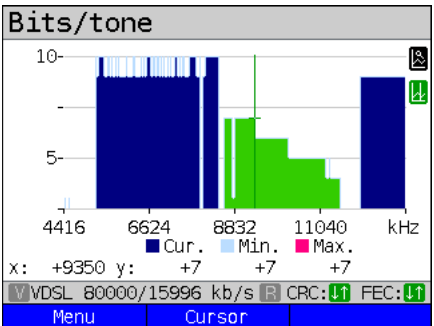


Available options:

Tone:	Displays the values of the x-axis as tones.
Frequency:	Displays the values of the x-axis as frequencies.

Direct setting of x-axis.

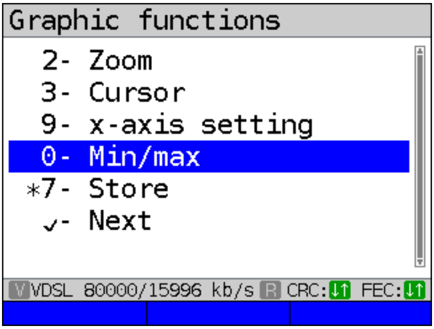




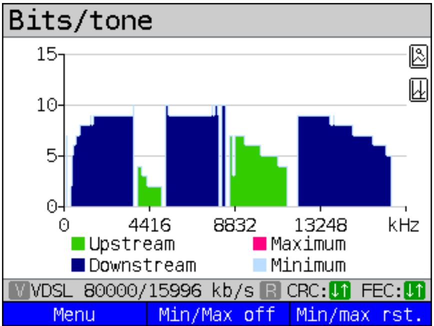
You can use the left and right cursor to scroll through the range (in this example frequency).

The zoom function and the cursor function can also be combined.
However, the starting position of the cursor can vary. The graph functions can be used for all graphs.

Continued on next page



With the Min/Max setting, the bits/tone and SNR/tone graphs display the minimum and maximum values.

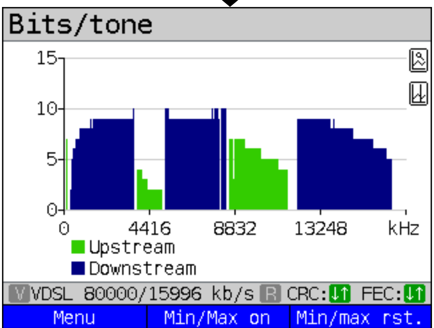


Displays the maximum value (pink).

Displays the minimum value (blue).

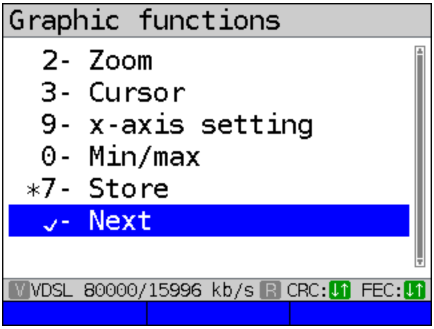
<Min/Max off> Hide min/max values.

<Min/Max rst.> Reset min/max values.

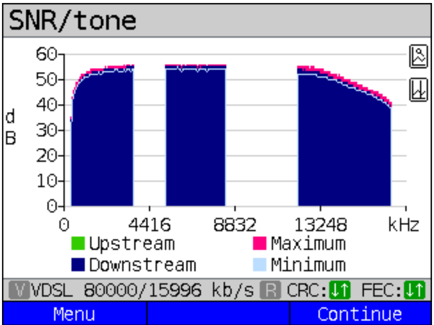


Displays the min/max softkeys.

Continued on next page



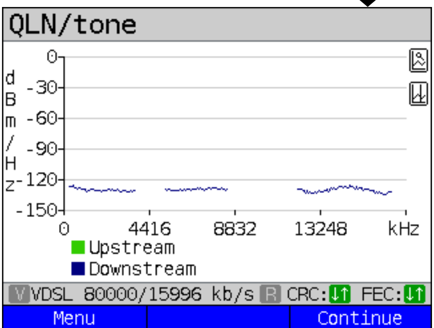
Additional result graphs



Display of signal-to-noise ratio (SNR) for each tone
y-axis: SNR in dB
x-axis: tones (channels)

This enables interference sources for individual tones (channels) to be detected, in this example downstream power backoff (DPBO).

<Menu> Opens the graph functions (see page 64).

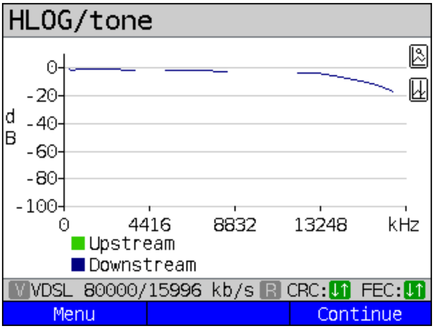


Display of quiet line noise (QLN) for each tone. The QLN represents the quiet line noise of the twisted pair as a function of the frequency.
y-axis: QLN in dBm/Hz
x-axis: tones (channels)

The QLN enables detection of narrow-band interference sources due to e.g. coupling of medium-wave emission sources or defective switching components. These interference sources are represented as narrow peaks. This example shows a line with interference from a power supply.

<Menu> Opens the graph functions (see page 64).

Continued on next page

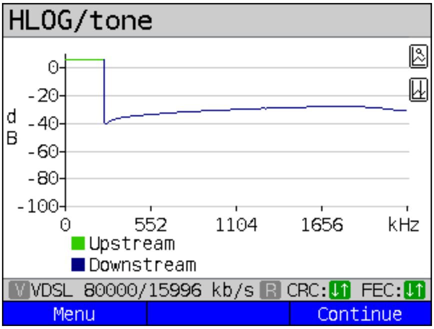


Displays the amplitude component of the transmission function (HLOG) for each tone. HLOG shows the attenuation of a connection as a function of the frequency.
Y-axis: Hlog in dB
X-axis: tones (channels)

On a nominally functioning line, the values drop off as the frequency increases; this function is virtually horizontal on short lines. This example shows a short line.

In the HLOG graphs, a shift can occur in calculating the upstream and downstream values from DSLAM compared to the downstream values from ARGUS. It can also happen that DSLAMs do not transmit the HLOG upstream values or send falsified values.

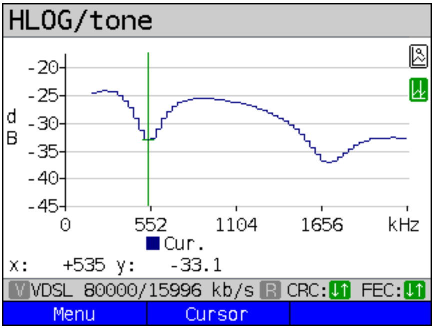
Example: Mismatch + poor contact on ADSL



DSL connections are often possible even though one of the two cores is high-ohm or even interrupted (only capacitive coupling). This results in dropped connections and data losses. Such problems can be due to oxidized lines, poor contacts in the telephone sockets, loose terminals or improperly insulated lines. In connections like this, lower frequencies are attenuated much more than higher frequencies. This is recognisable as an atypical relationship between upstream and downstream attenuation, as well as in the HLOG curve. In the event of a problem on one of the wires, the values for the low frequencies are often less than for the higher frequencies.

`<Menu>`	Opens the graph functions, see page 64.
`<Continue>`	ARGUS returns to the bits/tone graph.

Example: Bridge tap on ADSL

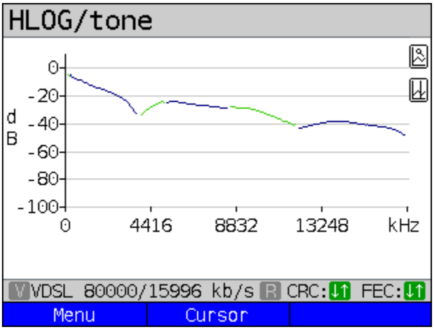


The example at left shows a sink. It can indicate a stub line (bridge tap).
With the rule of thumb:
L[m] = 50 / f [MHz],
you can estimate the length of a stub line if you know the frequency in MHz (in this example 0.535 MHz):

L [m] = 50 / 0,535 MHz = 93 m

There is a stub line approx. 93 m long.

Example: Bridge tap on VDSL



In this example, given a frequency of approx. 3.85 MHz, the stub line is approx. 13 m long.

ARGUS determines the following ADSL connection parameters:

ADSL connection parameters:	
Net data rate	Actually usable ATM bitrate in kbit/s.
Attainable data rate	Theoretically attainable ATM bitrate in kbit/s.
Relative capacity	Line capacity utilisation in percent.
Latency mode	ARGUS shows "interleaved" or "fast", depending on the DSLAM configuration.
Attenuation	Attenuation on a line over the entire length and bandwidth in dB. From a specific attenuation on, certain access types are no longer recommended. However, it is better to compare individually calculated attenuation values that are recommended for specific access types with the dB value in the HLOG graph, at 300 kHz (cursor).
Output power	Output power in dBm with reference to 1 mW.

SNR margin	Signal-to-noise ratio margin in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. This value is considered a reserve against interference signals. Rule of thumb: The SNR margin in downstream should - doubled - be at least equal to or greater than the SNR margin in upstream.
Impulse noise prot.	INP describes the quality of the protection against pulse interference. The number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers.
Interleave delay	The delay (in ms) due to interleaving of data blocks.
FEC	Forward error correction Number of transmission errors corrected using the checkbytes of a codeword. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
CRC	Cyclic redundancy check The checksum of the superframes transmitted by the remote station does not agree with the locally calculated figure. Possible cause: line interference. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
HEC	Header error checksum Number of ATM cells with incorrect header checksums. f (far): Errors that DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.
LOSS	Loss of signal seconds Shows the number of LOS errors in one second.

UAS	Unavailable seconds Number of seconds in which the ADSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. Once the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.
Reset	Indicates how often the user resets the error counters using the `<Reset>` softkey.
Resync	Number of resyncs by ARGUS.
Bitswap events	Shows how much data is diverted from a faulty transmission channel (up- and downstream) to other channels.
Retransmission (G.INP)	This parameter shows whether retransmission is activated for down- and/or upstream in DSLAM. When retransmission is activated, faulty data transmission units (DTUs) caused by transmission problems are requested and transmitted again. The following additional parameters are shown when retransmission is activated: The blue  in the ARGUS status line signals that retransmission is activated in DSLAM.  = Retransmission configured or not active (grey)  = Retransmission active (blue)  = Retransmission working (red)
Vendor far	ATU-C vendor.
Version	Vendor-specific information, contains the software version of the ATU-C side (DSLAM).
Vendor near	Manufacturer of the ARGUS chipset (ATU-R).
Version	Vendor-specific information, contains the software version of ARGUS.

ARGUS determines the following VDSL connection parameters

VDSL connection parameters:	
Net data rate	Actually usable ATM bitrate in kbit/s.
Attainable data rate	Theoretically attainable ATM bitrate in kbit/s.
Relative capacity	Line capacity utilisation in percent.

SNR margin	Signal-to-noise ratio in the bands used in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. The value is considered a reserve against interference signals. Bands not used are indicated with n/u.
Loop attenuation	Attenuation on a line over the entire length and bandwidth in dB. From a specific attenuation on, certain access types are no longer recommended. However, it is better to compare individually calculated attenuation values that are recommended for specific access types with the dB value in the HLOG graph, at 1 MHz (cursor). Bands not used are indicated with n/u.
Signal attenuation	Attenuation of the signal in dB in the corresponding bands. Bands not used are indicated with n/u.
Output power	Output power in dBm with reference to 1 mW.
Interleave delay	The delay (in ms) due to interleaving of data blocks.
Inpulse noise prot.	INP describes the quality of the protection against pulse interference. The number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers.
FEC	Forward error correction Number of transmission errors corrected using the checkbytes of a codeword. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
CRC	Cyclic Redundancy Check The checksum of the superframes transmitted by the remote station does not agree with the locally calculated figure. Possible causes: line interference. f (far): Errors that DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.
LOSS	Loss of signal seconds Shows the number of LOS errors in one second.

UAS	Unavailable seconds Number of seconds in which the VDSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. Once the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.
Reset	Indicates how often the user resets the error counters using the `<Reset>` softkey.
Resync	Number of resyncs by ARGUS.
Showtime no sync	Shows how often the connection status "showtime" was achieved without a long-term stable connection.
Bitswap events	Shows how much data is diverted from a faulty transmission channel (up- and downstream) to other channels.
Vectoring	The vectoring mode shows whether this remote station supports VDSL2 vectoring (ITU-T G.993.5). - Display shows "off" for non-vectoring. - ARGUS displays "Vectoring friendly" or "Full Vectoring" when vectoring is supported. See page 47 for more information.
SRA (Seamless rate adaption)	This parameter shows whether SRA is activated for down- and/or upstream in DSLAM. Seamless rate adaption (SRA) is a seamless adaption of the data rate during a DSL connection. In SRA, the data rate is adapted depending on the SNR margin during a connection.
Retransmission (G.INP)	This parameter shows whether retransmission is activated for down- and/or upstream in DSLAM. When retransmission is activated, faulty data transmission units (DTUs) caused by transmission problems are requested and transmitted again. The following additional parameters are shown when retransmission is activated: The blue  in the ARGUS status line signals that retransmission is activated in DSLAM.  = Retransmission configured or not active (grey)  = Retransmission active (blue)  = Retransmission working (red)

	Data transmission units (DTU)	Retransmission is performed before the CRC mechanism. As long as the retransmission mechanism requests and and transmits the erroneous DTUs in corrected form, no CRC errors (data losses) occur. If the retransmission mechanism cannot correct faulty transmissions, e.g. due to sustained interference, CRC errors (data losses) occur. - Retransmi. Multiple retransmitted DTUs due to a transmission problem. Is also displayed in the overview page 61 as "Retransmi". - Correct: Successful retransmission of a DTU - Uncorrect: Unsuccessful retransmission of a DTU
	INP REIN	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to REIN INP. This describes the quality of the protection against pulse interference. REIN (Repetitive electrical impulse noise) describes periodic interference pulses, usually caused by 230 V AC voltage from the supply mains. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs).
	INP SHINE	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to SHINE INP. This describes the quality of the protection against pulse interference.SHINE (single high impulse noise event) describes random, unpredictable, non-periodic interference pulses. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs).
	ETR	The expected throughput rate (ETR) in kBit/s is the minimum data rate that can be provided through complete error correction through retransmission.
Elec.length@1MHz	Indication of the electrical length for a frequency of 1 MHz in dB. R: VTU-R side C: VTU-C side	
Vendor far	VTU-C vendor.	
Version	Vendor-specific information, contains the software version of the VTU-C side (DSLAM).	
Vendor near	Manufacturer of the ARGUS chipset (VTU-R).	
Version	Vendor-specific information, contains the software version of ARGUS.	

ARGUS determines the following G.fast connection parameters:

G.fast connection parameters:	
Net data rate	Actually usable bitrate in kbit/s.
Attainable data rate	Theoretically attainable bitrate in kbit/s.
Relative capacity	Line capacity utilisation in percent.
SNR margin	Signal-to-noise ratio in the bands used in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. The value is considered a reserve against interference signals. Bands not used are indicated with n/u.
Signal attenuation	Attenuation of the signal in dB in the corresponding bands. Bands not used are indicated with n/u.
Output power	Output power in dBm with reference to 1 mW.
Interleave delay	The delay (in ms) due to interleaving of data blocks.
Impulse noise prot.	INP describes the quality of the protection against pulse interference. The number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers.
FEC	Forward error correction Number of transmission errors corrected using the checkbytes of a codeword. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
CRC	Cyclic Redundancy Check The checksum of the superframes transmitted by the remote station does not agree with the locally calculated figure. Possible causes: line interference. f (far): Errors that the DSLAM detects and passes to ARGUS. n (near): Errors that ARGUS detects in the transmitted blocks.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.

LOSS	Loss of signal seconds Shows the number of LOS errors in one second.
UAS	Unavailable seconds Number of seconds in which the VDSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. Once the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.
Reset	Indicates how often the user resets the error counters using the `<Reset>` softkey.
Resync	Number of resyncs by ARGUS.
Showtime no sync	Shows how often the connection status "showtime" was achieved without a long-term stable connection.
Bitswap Events	Shows how much data is diverted from a faulty transmission channel (up- and downstream) to other channels.
SRA (Seamless Rate Adaption)	This parameter shows whether SRA is activated for down- and/or upstream in DSLAM. Seamless rate adaption (SRA) is a seamless adaption of the data rate during a DSL connection. In SRA, the data rate is adapted depending on the SNR margin during a connection.
Retransmission (G.INP)	This parameter shows whether retransmission is activated for down- and/or upstream in DSLAM. When retransmission is activated, faulty data transmission units (DTUs) caused by transmission problems are requested and transmitted again. The following additional parameters are shown when retransmission is activated: The blue  in the ARGUS status line signals that retransmission is activated in DSLAM.  = Retransmission configured or not active (grey)  = Retransmission active (blue)  = Retransmission working (red)

	Data transmission units (DTU)	Retransmission is performed before the CRC mechanism. As long as the retransmission mechanism requests and and transmits the erroneous DTUs in corrected form, no CRC errors (data losses) occur. If the retransmission mechanism cannot correct faulty transmissions, e.g. due to sustained interference, CRC errors (data losses) occur. - Retransmi. Multiple retransmitted DTUs due to a transmission problem. Is also displayed in the overview page 61 as "Retransmi". - Correct: Successful retransmission of a DTU - Uncorrect: Unsuccessful retransmission of a DTU
	INP REIN	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to REIN INP. This describes the quality of the protection against pulse interference. REIN (Repetitive electrical impulse noise) describes periodic interference pulses, usually caused by 230 V AC voltage from the supply mains. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs).
	INP SHINE	In ARGUS, interference immunity (DSLAM setting) is displayed with respect to SHINE INP. This describes the quality of the protection against pulse interference.SHINE (single high impulse noise event) describes random, unpredictable, non-periodic interference pulses. The value indicates the number of consecutive DMT symbols that can be completely distorted without causing errors in higher layers (1 DMT symbol = ~250 µs).
	ETR	The expected throughput rate (ETR) in kBit/s is the minimum data rate that can be provided through complete error correction through retransmission.
Elec.length@1MHz	Indication of the electrical length for a frequency of 1 MHz in dB. R: FTU-R side C: FTU-C side	
Vendor far	Manufacturer of the ARGUS chipset (FTU-R).	
Version	Vendor-specific information, contains the software version of the FTU-C side (DSLAM).	

Vendor near	Manufacturer of the ARGUS chipset (FTU-R)
Version	Vendor-specific information, contains the software version of ARGUS.

System information for transmission to the ADSL/VDSL remote station

When a modem is synchronised with a DSLAM, the vendor and device type of the modem is generally displayed in the control system of the DSLAM. For ADSL and VDSL, this occurs according to ITU-T G.997.1. When an ARGUS device synchronises with a DSLAM, the latter reports to the control system the following information, depending on the DSLAM.

Information	Display in DSLAM	Meaning
System vendor ID	0x04, 0x00 (hex)	Country code: Germany
	INGE or 0x49, 0x4E, 0x47, 0x45 (hex)	Provider code: intec Germany
	0x20, 1x01(hex)	System FW version: 1.01.0
Version number	R1.01 U_	Device FW version: 1.01.0
Serial number	ARGUS156-9999-R1.01.0U_	Device type: ARGUS 156 / device serial number 9999

ARGUS determines the following SHDSL connection parameters:

SHDSL connection parameters:	
SNR margin	Signal-to-noise ratio margin in dB. The SNR margin is a measure of how much additional noise the transmission can stand and still maintain a bit error rate (BER) of 10^{-7}. This value is considered a reserve against interference signals.
SNR	Signal-to-noise ratio in dB.
Attenuation (dB)	Attenuation on a line over the entire length in dB.
Output Power	Output power in dBm with reference to 1 mW.
CRC	Cyclic Redundancy Check Number of CRC anomalies (CRC6 checksum errors), also known as code violations (CV). The sums of the one-second periods are totalled by ARGUS.
LOSWS	Loss of sync word seconds Number of seconds containing one or more erroneous sync words.
ES	Errored seconds Number of seconds containing one or more erroneous sync words and/or one or more CRC anomalies.
SES	Severely errored seconds Number of seconds containing one or more erroneous sync words or at least 50 CRC anomalies.
US	Unavailable seconds Number of seconds in which the SHDSL link was unavailable. The connection is considered unavailable at 10 consecutive SESs at the latest. The 10 SESs are added to the time that the connection is unavailable. If the connection is unavailable, it only becomes available when no SESs occur in 10 consecutive seconds. The 10 SES-free seconds are added to the time that the connection is unavailable.

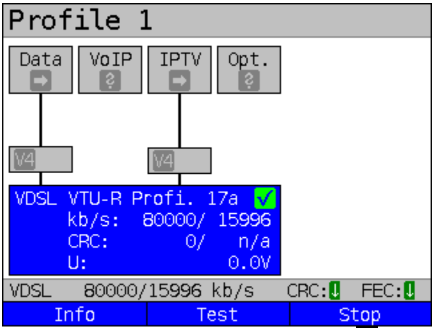
Meaning of the running EFM states (from the STU-R perspective)			
Power down			STU-R / STU-C in idle state.
Initialization	red	SHDSL Initialization	Initialisation - "power on".
GHS startup	light blue	SHDSL GHS startup	Handshake according to ITU-T G.994.1, G.hs is started.
GHS transfer	yellow	SHDSL GHS transfer	Replacement of the capability list completed.
Discovery			Start of the discovery phase.
Discovery accepted			Discovery probe accepted.
Discovery finished			Discovery phase finished.
Aggregation accepted			Aggregation probe accepted.
Aggregation finished			Aggregation phase finished.
GHS finished	orange	SHDSL GHS finished	Handshake (G.hs) successfully completed.
Data	green	SHDSL Data	Data mode achieved, showtime.
Data Error			An error, e.g. loss of sync. has occurred.

System information for transmission to the SHDSL remote station

When a modem synchronises with DSLAM, the vendor and device type of this modem are generally displayed in the DSLAM's control system. In SHDSL, this is carried out according to “ITU-T G.991.2 table 9-10". When an ARGUS device synchronises with a DSLAM, the latter reports to the control system the following:

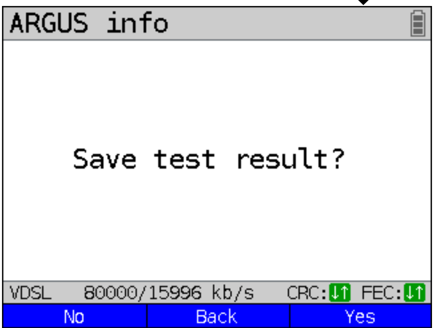
Info:	Entry:	Example ARGUS:
Vendor ID	intec-Name	"intec"
Version model	Device type	"Argus156"
Vendor serial	Serial number	"9999"
Other vendor information	Device SW	"R1.01.0 U_"

Disconnecting the G.fast and xDSL connection and saving the results



ARGUS in status screen.

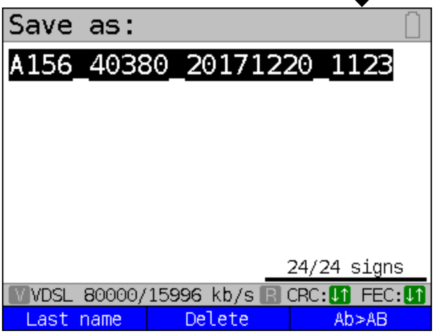
Disconnecting the VDSL connection.



<No> Results are rejected.

<Back> Results are not saved. ARGUS returns to the status display.

<Yes> Saving the result.

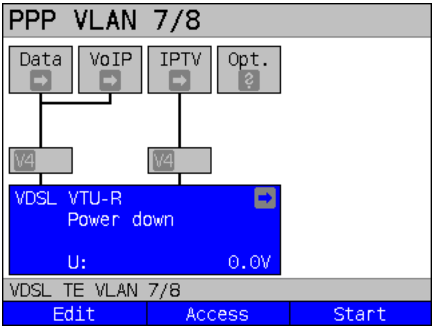


Saving the result

Continued on next page

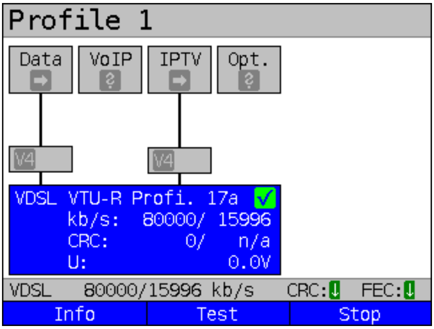
ARGUS saves the VDSL connection parameters together with the trace data in the first free slot. You can enter a user-definable name when saving (see page 281). ARGUS automatically suggests a save name, which is composed of:
- the device type (in this example A156)
- the serial number (in this example 40380)
- the configured date (in this example 20th december 2017)
- the configured time (in this example 11:23 h)

If all slots are occupied, you need to manually select a slot to overwrite.



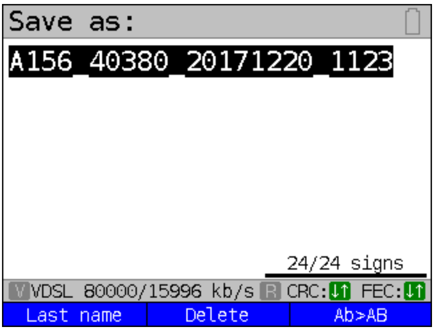
After saving, ARGUS returns to the status display or ARGUS status.
You can initialise a new sync attempt directly using <Start>.

Saving the results without disconnecting the G.fast and xDSL connection



ARGUS in status screen.

 and  Saves the result without disconnecting the connections.



ARGUS automatically suggests a save name.

<Last name>	The last name used is suggested.
<Delete>	Deletes the suggestion.
<Ab>AB>	Entry of upper- and lower-case letters and @, /, -, .

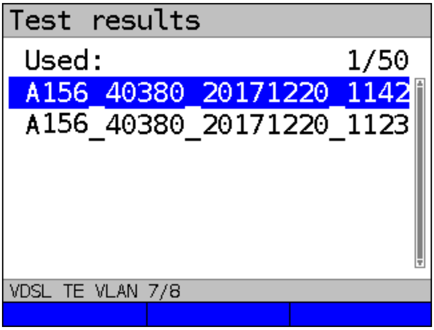
Results accepted with the storage name shown.

Displaying stored test results

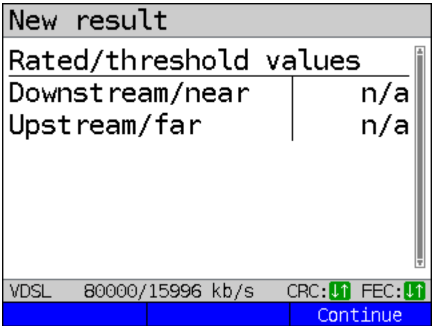
ARGUS in Main Menu

In ARGUS status, press <Menu>.

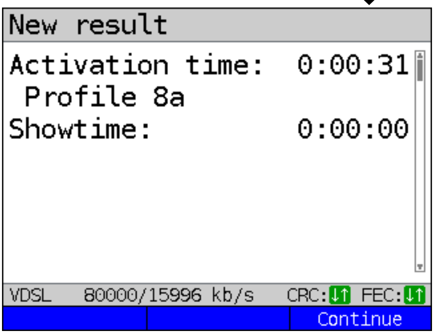
When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .



Marked the stored test result.



Displays the test results:
ARGUS shows whether the downstream and upstream values are within the limits.



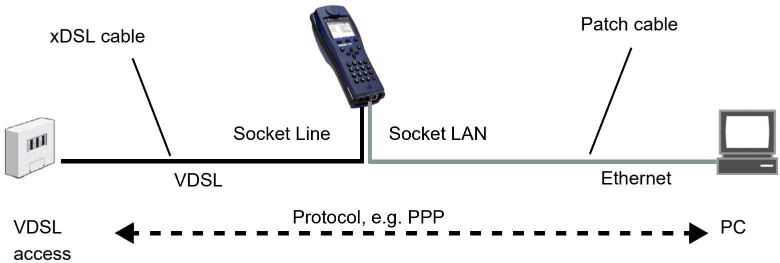
Browse VDSL connection parameters.

<Continue> Displays the signal-to-noise ratio per tone (SNR/tone), QLN/tone, HLOG/tone and the trace data.

Exits results.

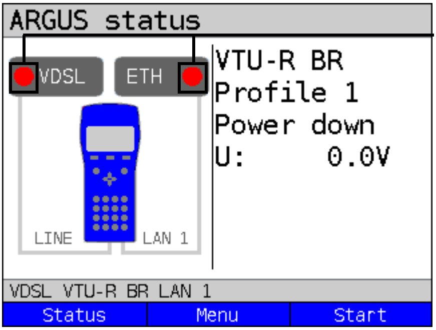
7.4 ARGUS in access mode xTU-R bridge

Connect ARGUS to the PC using the patch cable and to the VDSL access using the xDSL cable. In bridge mode, ARGUS acts as a VDSL modem, i.e. ARGUS passively hands on all packets from the Ethernet to VDSL (and vice versa). In this case, the PC is responsible for establishing the connection.



ARGUS in access mode xTU-R bridge

In this example, VDSL VTU-R bridge mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).



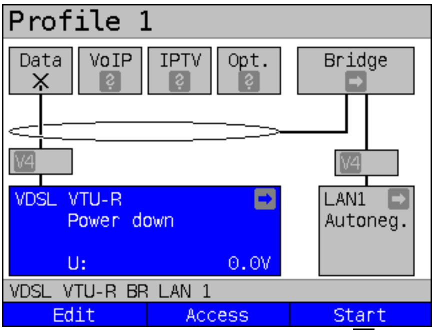
Test not yet started:
red LED in display

Meaning of LED image in display:

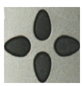
Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

Display:

- Access mode
- Default profile, see page 43
- Current status
- DC voltage at interface

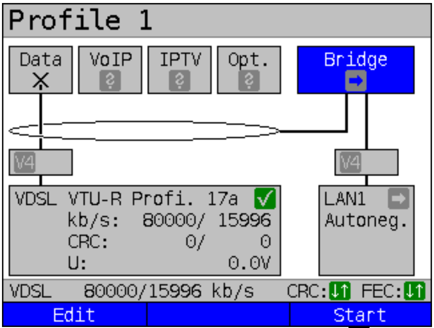


`<Edit>`	VDSL settings.
`<Access>`	Edits an access.
`<Start>`	Starts VDSL.



Switch to bridge mode using the cursor keys, see page 98.

Establishing a VDSL connection

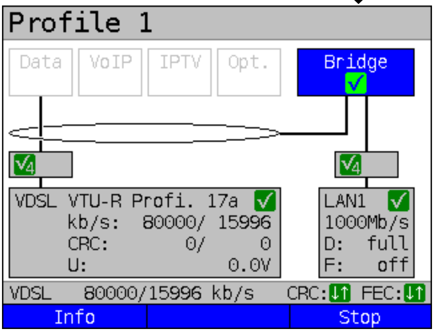


The VDSL connection is established (green tick mark in layer-1 box).

<Edit> Bridge/router parameter settings.

Establishing the VDSL bridge

The bridge can also be activated directly. If layer 1 has not yet been established, this is automatically started as well.



<Stop> Deactivates bridge mode.

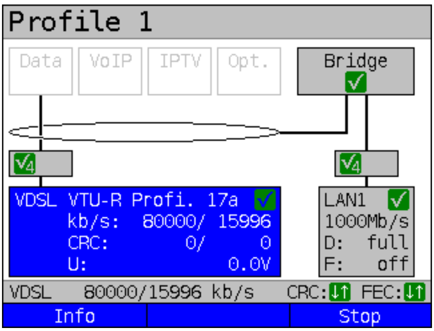
<Info> Displays the activity of bridge mode.

When the physical layer is active (only ADSL), you can run the following tests using the softkey **<Test>**, see page 122.

⚠ No tests are available when bridge mode is active.

Displays the connection parameters.

Switches to the layer-1 box and other elements, see page 98 for explanation.



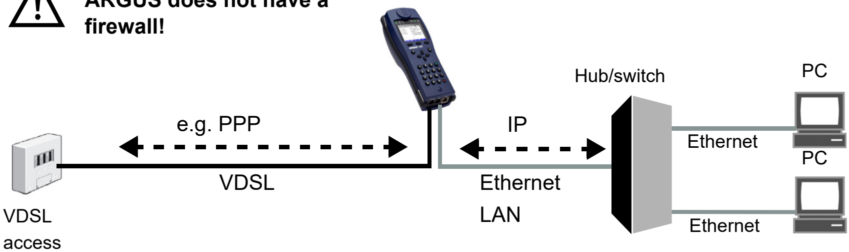
<Info> or Displays the VDSL connection parameters, see page 61.

<Stop> Disconnects the VDSL connection and automatically deactivates the bridge.

7.5 ARGUS in access mode xTU-R router

Connect ARGUS to the PC using the patch cable and to the VDSL access using the xDSL cable.
In router mode, ARGUS replaces both the modem and the router, so that multiple PCs can access a network connection (via a hub/switch). The IP addresses of the network are either issued statically or ARGUS is designated the DHCP server and assigns IP addresses to the connected PCs.

ARGUS does not have a firewall!

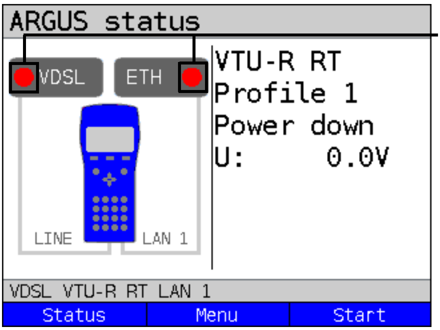


Bridge/router settings, see page 54.

xDSL settings, see page 43 and following.

Settings in access mode xTU-R bridge

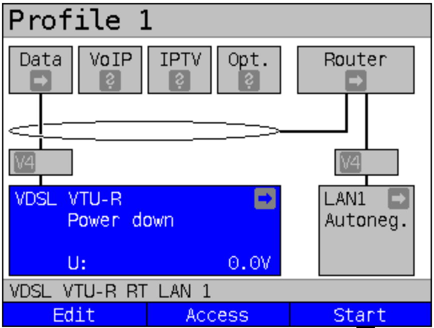
In this example, VDSL VTU-R router mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25).



Test not yet started:
red LED in display
Meaning of LED image in display:

Red LED:	no test started
Yellow LED:	test started
Green LED:	connected

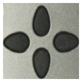
Display:
- Access mode
- Default profile (profile 1)
- Current status
- DC voltage at interface



<Edit> VDSL settings.

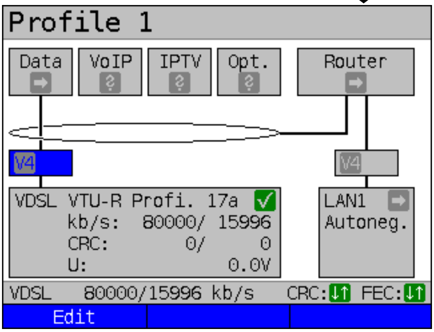
<Access> Edits an access.

<Start> Starts VDSL.



Switch to router mode using the cursor keys, see page 98.

Establishing the VDSL connection



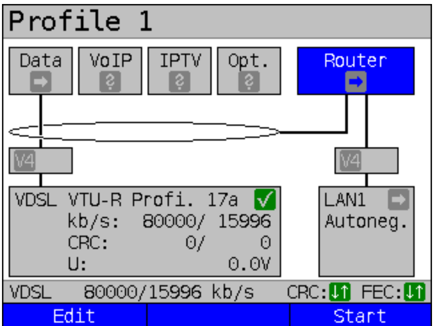
When the physical layer is active (only ADSL), you can run the following tests using the softkey **<Test>**, see page 122.

⚠ No tests are available when router mode is active.

Virtual line selected.

<Edit> Edits the parameters, see chapter „9 Virtual lines (VL)“ (see page 97).

Switch to Router using the cursor keys, see page 98.



Router selected.

The router can also be activated directly. If layer 1 has not yet been established, this is automatically started as well.

<Edit> Bridge/router parameter settings, see page 54.

Establishing the VDSL router.
The VDSL connection is active.

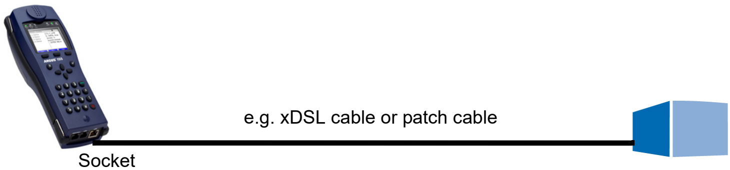
See page 85 for bridge mode display and operation.

7.6 ARGUS in access mode STU-C

Determining the SHDSL connection parameters

ARGUS is connected to the SHDSL modem directly using the supplied xDSL, patch, SHDSL 4-wire or SHDSL 8-wire banana cable. In this case, ARGUS replaces the DSLAM (STU-C). ARGUS establishes an SHDSL connection and determines all relevant SHDSL connection parameters. ARGUS displays the SHDSL connection parameters and, if desired, saves them when the link is disconnected.
The procedure is the same for SHDSL 2-wire ATM, SHDSL 4, 6 and 8-wire connections and for EFM.

⚠ **Use only the patch cable supplied with the device.**



Configuring access mode STU-C:

SHDSL STU-C mode is explained in chapter „5 Configuring accesses“ (see page 25), including configuration and selection.

Connecting SHDSL on the STU-C side:

Connect STU-C and display the connection parameters (see page 80) via `<Info>` as for VTU-R, see page 57.

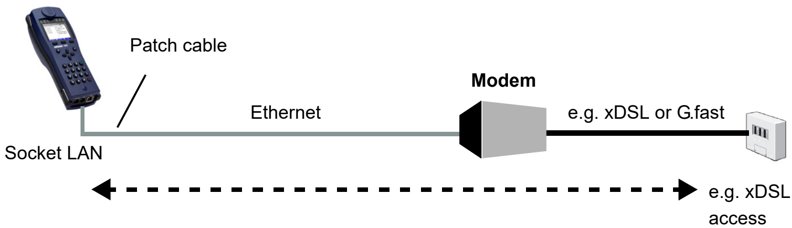
When the SHDSL physical layer is active, you can run the following tests using the softkey `<Test>`, see page 311.

8 Operation with Ethernet accesses

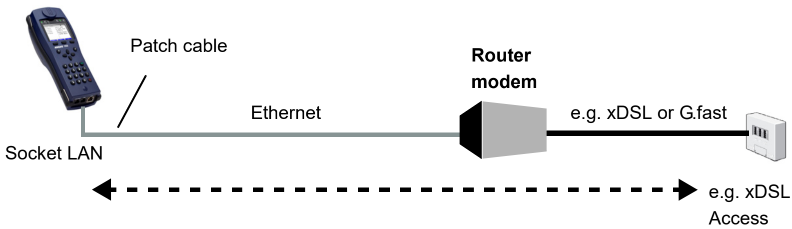
ARGUS supports the following access modes in Ethernet operation:

⚠ The individual tests acquire and store data. It is the user's responsibility to comply with the applicable legal requirements.

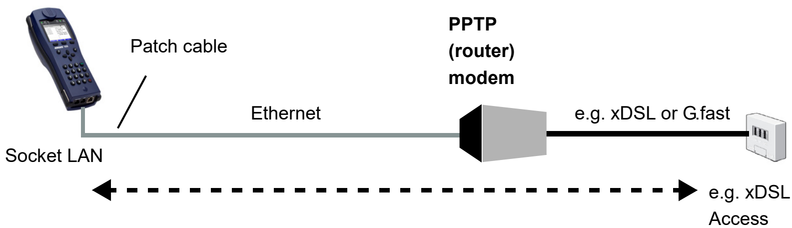
Connecting to a modem:



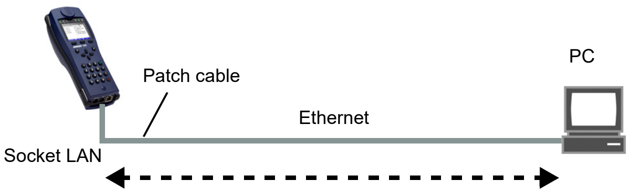
Connecting to a router modem:



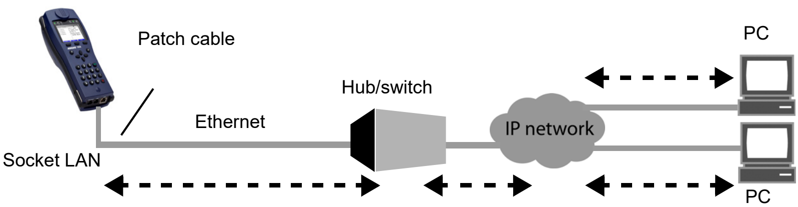
Connecting to a PPTP router modem:



Connecting to a PC via IP



Connecting to an IP network:



8.1 Configuring the Ethernet interface

Please refer to chapter „5 Configuring accesses“ (see page 25) for instructions on configuring the Ethernet interface.

Note: accessing functions via number keys/key combinations
You can call important functions/tests directly using the keys of the ARGUS keypad. You can find an overview of these key combinations on page 122.

8.2 Ethernet settings

You can modify the Ethernet settings as described for VDSL, see page 43.

Setting	Description
Preconfigured accesses	
Phys. parameters:	
Ethernet:	
Autonego-tiation	Switches on or off When autonegotiation is switched on, network cards can automatically detect the correct transmission speed and duplex method of the Ethernet port to which they are connected and configure themselves accordingly. In Ethernet, autonegotiation is based on layer 1 of the OSI model (according to IEEE standard 802.3u). Default: ***on*** To set this to **off**, see the following section below.
MAC address, see page 45.	
Gratu-itous ARP	Determines whether Gratuitous ARP (Address Resolution Protocol) is to be used. When this is set to “on“, ARGUS transmits one ARP message every 60 seconds unrequested to communicate its MAC address. Default: ***Off***
LACP	Determines whether the LACP (Link Aggregation Control Protocol) information is to be displayed. Default: **off**

See chapter „9.4 Virtual line settings“ (see page 107) for further configurations.

Autonegotiation/Ethernet link parameters

Ethernet link autonegotiation is supported by default!

Setting: autonegotiation "on"

When negotiating the link parameters, ARGUS informs the remote station that the following is supported (these settings are fixed and cannot be configured):

- 10, 100 or 1000 Mbit/s
- Half or full duplex
- Flow control on/off (for on: symmetric and asymmetric pause)

Manually configuring the Ethernet link parameters

Setting: autonegotiation "off"

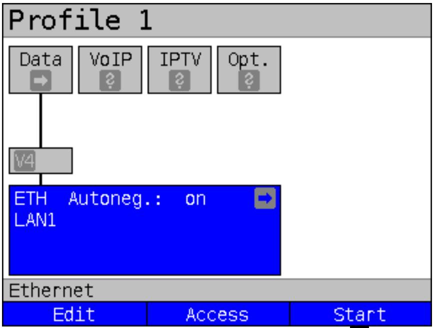
When autonegotiation is deactivated, the speed, duplex and flow control ("pause" method) can be configured in the profile (see above).

- 10, 100 or 1000 Mbit/s, default: ***100 Mbit/s***
- Half or full duplex, default: ***full***
- Flow control on/off ("Flow control off" is only useful in full duplex mode)
  Default: ***on***

Unilateral autonegotiation

When a terminal device with autonegotiation "on" encounters a device without autonegotiation, no information is transmitted by the remote station. Even without autonegotiation, the speed is determined using the pulse method/idle pattern (parallel detection). In this case, the terminal device with autodetection generally drops back to half duplex (duplex mismatch possible), which can result in a duplex mode conflict with "poor throughput".

8.3 Establishing an Ethernet connection



ARGUS in the status screen.

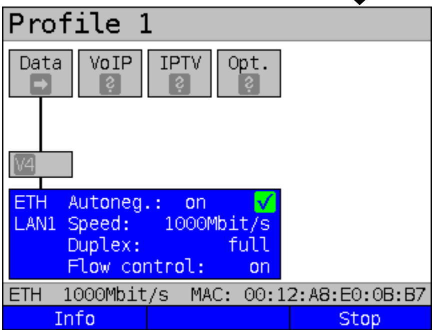
ARGUS uses the default profile (profile 1 in the example) to establish an Ethernet connection.

The test has not yet started!

Meaning of the arrow in the layer-1 box

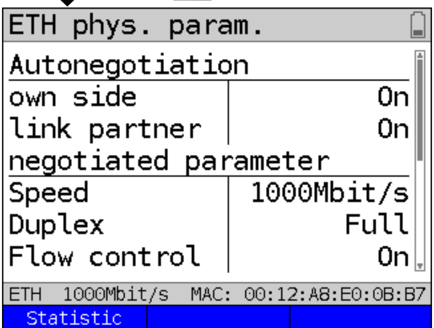
Gray arrow	no test started
Yellow arrow	test started
Green check mark	connected

Establishing an Ethernet connection



`<Info>`	Displays Ethernet connection parameters.
`<Stop>`	Stops the Ethernet connection.

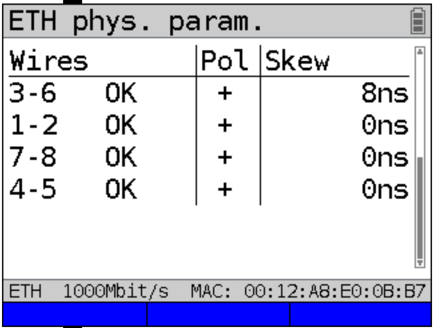
or



Display:

- Autonegotiation setting
- Autoneg. at remote station
- Negotiated speed
- Type of duplex mode
- Flow control setting

`<Statistic>`	Opens Ethernet statistics



Displays polling and offset between wires

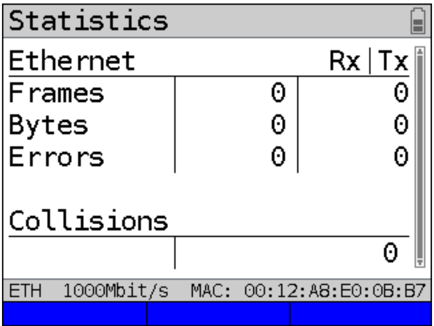
- Wire allocation:

  Left column ARGUS wire allocation

  Right column ARGUS wire allocation after autonegotiation with remote terminal. When the display shows "OK", the remote station has inverted the wire allocation.

- Polling
- Skew in ns

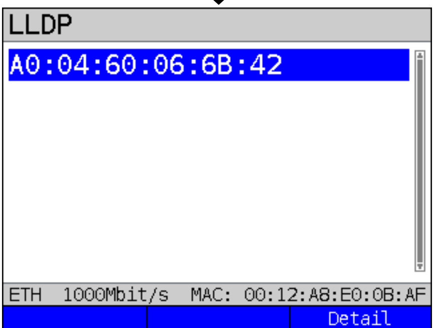
s. <Statistic> page 94



Statistic display

- Received (Rx) and transmitted (Tx) internet frames
- Received (Rx) and transmitted (Tx) bytes
- Number of errors on the receiver (Rx) and transmitter (Tx) side
- Number of collisions

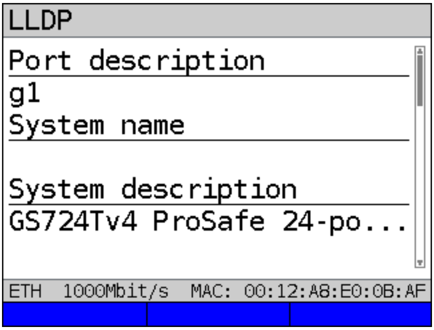
<LACP> LACP s. page 96.



Display LLDP:

- Displays the MAC address of neighbour devices.

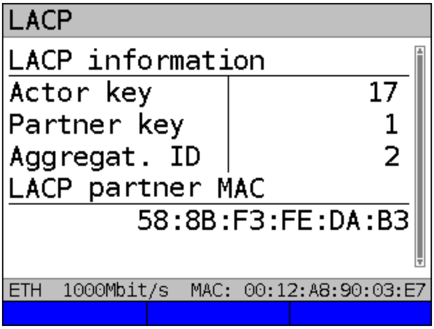
Continued on next page



Display LLDP:

- Port description
- System name
- System description
- Chassis ID
- Port ID
- Management address
- Features

Display of LACP information



Display LACP:

- Actor key
- Partner key
- Aggregation ID
- LACP partner MAC address

Disconnecting from the Ethernet connection and saving the results

You can disconnect and save the results from an Ethernet connection as described for VDSL, see page 82.

Saving the results without disconnecting from the Ethernet connection

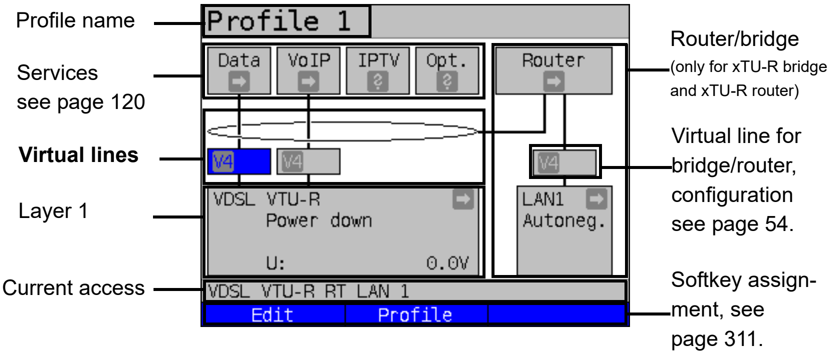
You can save your results for an Ethernet connection without disconnecting in the same way as for VDSL, see page 83.

9 Virtual lines (VL)

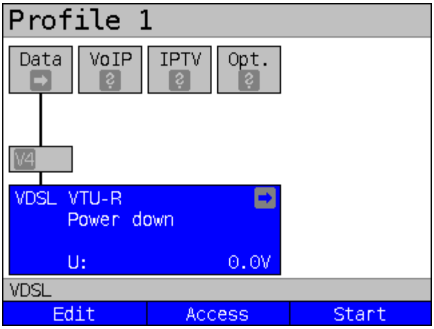
Virtual lines (VL) compile the configurations of layer 2 and layer 3 into profiles, called the VL profiles. These profiles contain e.g. information on protocols, VPI/VCIs, VLANs and PPP data (stored in their own subordinate PPP profiles). Virtual lines can be used to conduct tests across multiple VPI/VCIs or VLANs and across different protocols.
ARGUS allows you to define up to 20 such VL profiles. In a VL profile, you can edit e.g. the protocol configuration. The VL profiles can be assigned to one or more services independently of the state of the physical layer (layer 1).
Thus, a data test (e.g. IP ping and a VoIP test (e.g. VoIP call) can be performed on a single active access without having to re-establish layer 1 (G.fast, DSL, Ethernet) in spite of differing protocols.

9.1 Virtual lines in the status screen

The virtual lines in the status screen are explained using the access VDSL VTU-R router:

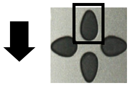


The status screen is divided into three levels that can be individually selected using the cursor keys of the ARGUS keypad.
The status screen is described in greater detail using three display examples.

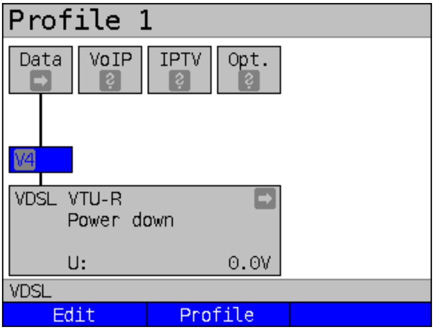


Level 1: physical layer (see page 40)

<Edit>	Configures physical layer.
<Access>	Selects access.
<Start>	Establishes physical layer of the selected access.



Cursor up

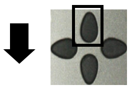


Level 2: virtual lines

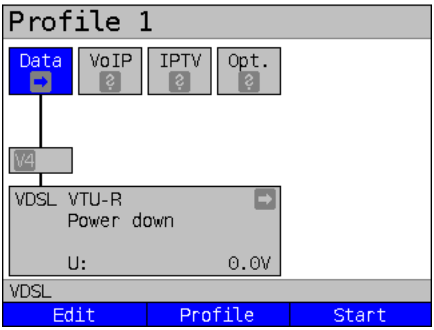
<Edit>	Configures virtual line, see page 102.

Configuration options:
- Protocol (IP, PPP, PPTP)
- ATM, see page 107
- VLAN, see page 108
- PPP (PPP profiles)
- PPTP, see page 109
- IP version (IPv4, IPv6, dual)
- IPv4, see page 110
- IPv6, see page 112
- BGP, see page 117
- Data log (for this VL)
- Profile name, see page 113

<Profile>	Configures the profile.



Cursor up



Level 3: services (see page 120)

<Edit>	Assigns a VL to a service and configures it.
<Profile>	Configures the profile.
<Start>	Starts the service.

The virtual line and the physical layer start automatically when you press the softkey <Start>.

Depending on the state of the physical layer, the virtual lines or the services, ARGUS displays a variety of symbols in the status screen.

 This service has not yet been assigned to a virtual line.

 This service, VL or physical layer is idle.

 This service is not available (bridge mode only).

 Preparing activation of physical layer, VL or service.

 Activating the physical layer, VL or service.

 Physical layer, VL or service deactivated due to an unexpected occurrence.

 Deactivating.

 Synchronisation achieved (physical layer) or a VL or service was activated successfully without errors.

 A test is currently running in this service.

 An error occurred here. Reset with `<Reset>` to continue with the VL/service.

9.2 Virtual line profiles (VL profiles)

The various profile types are explained below:

Profiles (1 - 20), see page 35:

- These contain the assignments of the services (Data, VoIP, IPTV, Opt.) to one or more virtual lines.
- In addition to the services, the settings for the bridge/router and the test parameters can be found here as well.
- Every profile can be assigned an individual profile name.

VL profiles (virtual lines 1 - 20)

- These contain the layer 2/3 settings.
- VL profiles are assigned to services.
- One VL can be assigned to multiple services.
- The VL profiles can be assigned to PPP profiles.

PPP profiles (1 - 20)

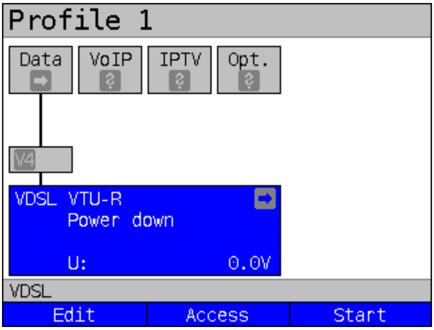
- These contain all relevant data for dialling.
- PPP profiles are assigned to VL profiles.
- One PPP profile can be assigned to multiple VL profiles.

Relationships between profile types

When all configurations are reset (see page 305), a VL profile (1-20) is only assigned to the service data in each profile (1-20). One PPP profile is assigned to each VL profile (1-20). All other services (such as VoIP, IPTV and Opt.) are initially not assigned a VL profile or a PPP profile.

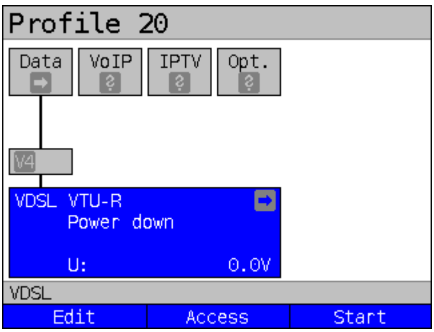
The assignment further VL and PPP profiles to services is described starting on page 102.

Default configuration:



Profile 1

Service Data	=>	VL profile 1	=>	PPP profile 1
Service VoIP		...		...
Service IPTV		...		...
Service Opt.		...		...



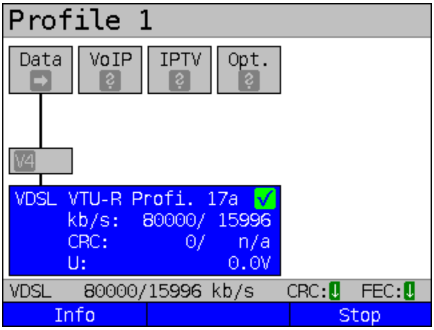
Profile 20

Service data	=>	VL profile 20	=>	PPP profile 20
Service VoIP		...		...
Service IPTV		...		...
Service Opt.		...		...

9.3 Activating a virtual line

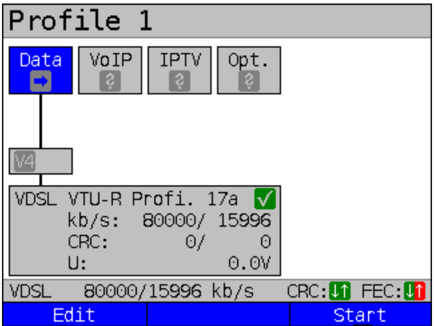
A service or test must be started in order to activate a virtual line. To enable a test to be started, a service must be configured, and a virtual line assigned to it. In this example, the service Data is configured and assigned ot a virtual line.

9.3.1 Starting a service



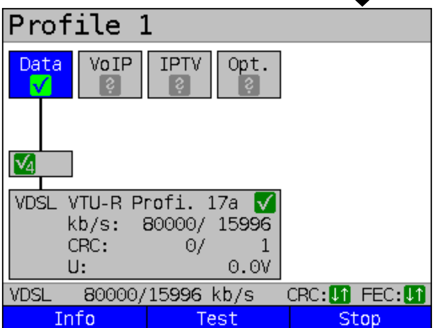
The VDSL access is active.

Use the cursor keys to switch from the layer-1 box over the virtual line to the service Data.



⚠ If the physical layer is not yet active, this is started automatically with the service or test.

<Start> Starts the service.



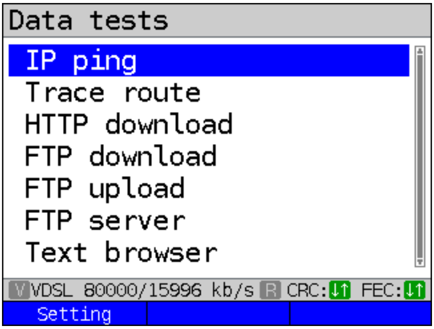
Continued on next page

The physical layer (VDSL), the virtual line and the service Data are now active. This is indicated by a green check mark.

<Info> Displays information on the service Data (e.g. duration of activity).

<Stop> Stops the service Data.

See page 120 for explanations of the services.

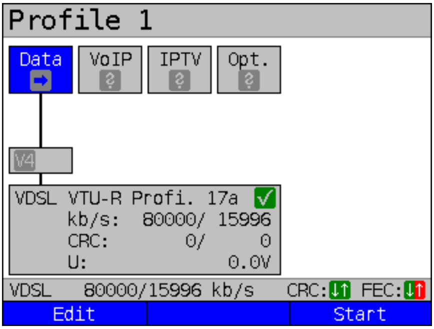


The tests that can be run using the service Data are displayed.

<Setting> Configures the respective test (in this example IP ping). A detailed description is provided in the chapter Test, see page 137.

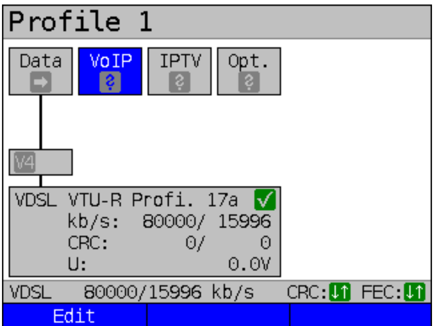
9.3.2 Assigning additional virtual lines

ARGUS can use multiple services concurrently (e.g. Data and VoIP) via a single virtual line. In this example, VDSL is active. The service Data is selected. The following explains how multiple services can be connected via a single virtual line.



To configure a virtual line (in this example for the service Data) for other services, you must first stop the service.
The physical layer remains active.

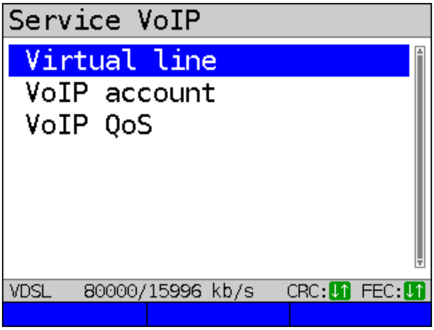
The service VoIP is greyed out when the VoIP option is not set.



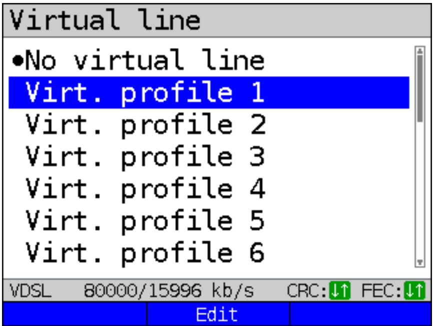
Using the cursor keys, select the service VoIP.

<Edit> Opens the configuration of the selected service (in this example VoIP).

Continued on next page



Select "Virtual line".

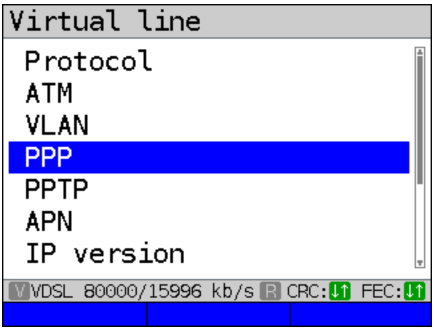


Select the virtual profile you wish to edit. The selected profile is highlighted in blue in the display.

Elements not available are grayed out, for instance when they are currently active.

<Edit> The configuration options are described starting on page 107.

Edit the selected VL profile.

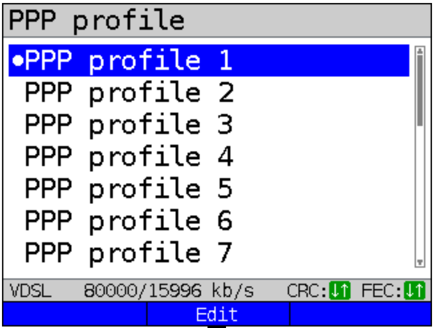


e.g. select PPP

The configuration options are described starting on page 109.

Opens PPP profile selection

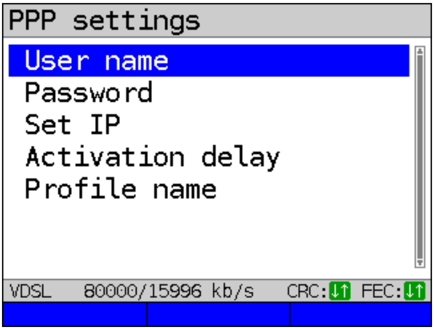
Continued on next page



e.g. select PPP profile 1

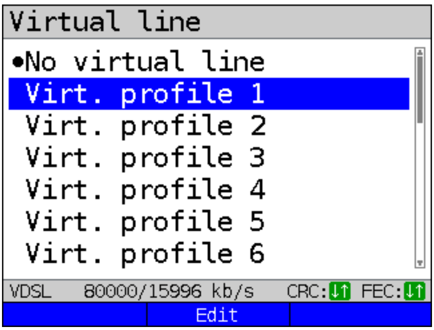
Up to 20 PPP profiles can be configured.

<Edit> Edits the selected PPP profile, see page 109.



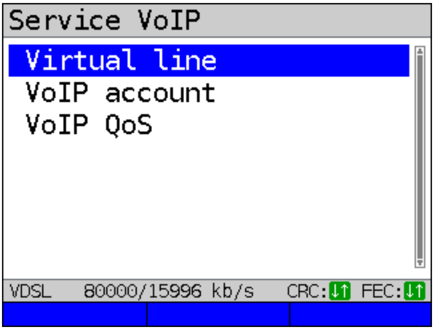
The configuration options are described starting on page 109.

3x

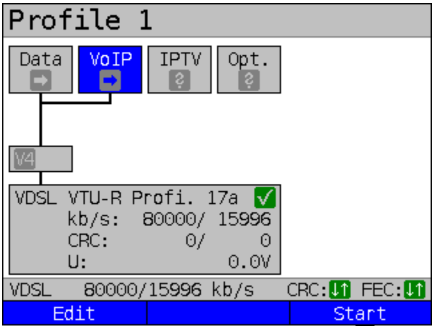


⚠ The desired profile has not yet been selected.

Continued on next page

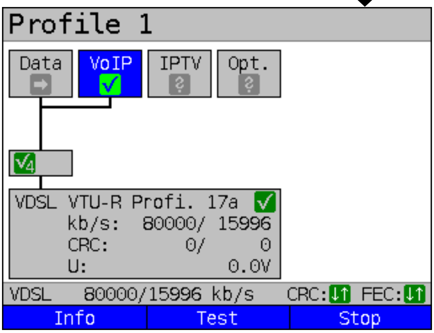


ARGUS switches to the status screen or the Settings menu (depending on whether you accessed the profiles using the main menu or the status screen).



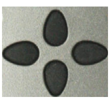
The services Data and VoIP are now connected to the physical layer (VDSL access) via a virtual line.

`<Start>` Starts the service VoIP.

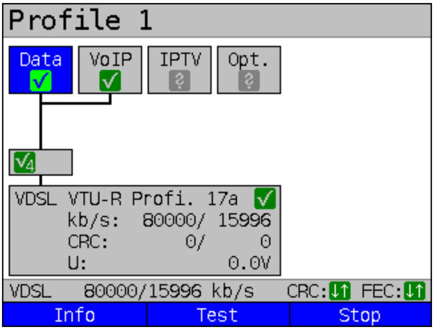


The service VoIP is now active.
You can now run a variety of tests via the service VoIP.

In the next step, you can now activate a further service.



Select Data using the cursor keys and press `<Start>` to activate the service.

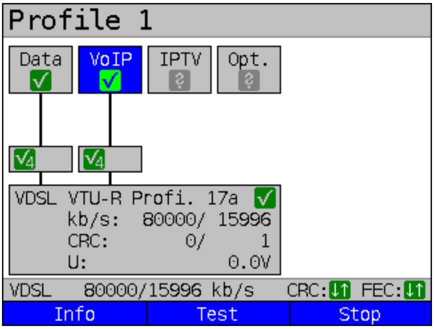


The services Data and VoIP are active.
You can now run a variety of tests via the services Data and VoIP.

The display and operation for IPTV and Opt. are the same as for VoIP.

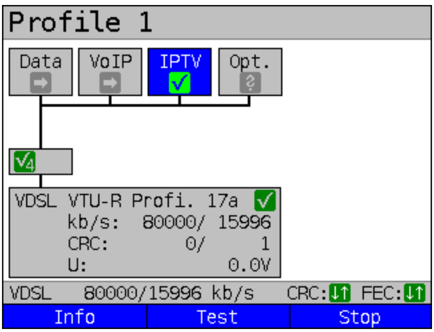
Further examples of different virtual line assignments:

Example 1:



One virtual line is connected with the service Data and another with the service VoIP.
The virtual line for VoIP can thus be used for different protocol data than the virtual line for Data.

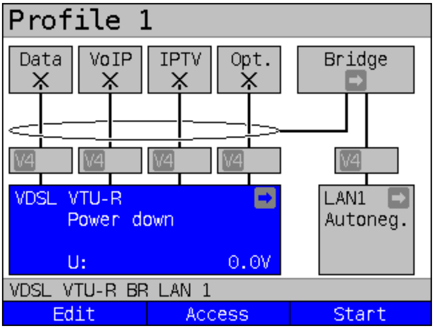
Example 2:



One virtual line was configured for the services Data, VoIP, IPTV und VoD.
In this example, the services IPTV and VoD are active.

⚠ Up to four virtual lines can be established for the service IPTV. However, ARGUS only displays these as a single composite virtual line.
A detailed description is provided in the chapter IPTV, see page 199.

Example 3:



In this example, each service was assigned a virtual line.
As ARGUS is in bridge mode, these services cannot be executed.

9.4 Virtual line settings

<table>
<tr><th colspan="2">Setting</th><th colspan="6">Description</th></tr>
<tr><td colspan="8"><code>Virt. profile 1 to 20</code></td></tr>
<tr><td colspan="2"><code>Protocol</code></td><td colspan="6">Selection of transmission profile that ARGUS uses for the test (e.g. for the IP tests).
Default: PPP</td></tr>
<tr><td rowspan="2">Protocol</td><td>ATM:</td><td colspan="6">Interfaces:</td></tr>
<tr><td>ATM with ETH</td><td>ADSL</td><td>VDSL</td><td>G.fast</td><td>SHDSL ATM</td><td>SHDSL EFM</td><td>ETH</td></tr>
<tr><td>IP</td><td>no</td><td>EoA</td><td colspan="2" rowspan="2">IP</td><td>EoA</td><td colspan="2" rowspan="2">IP</td></tr>
<tr><td>IP</td><td>no</td><td>IPoA</td><td>-</td></tr>
<tr><td>PPP</td><td>yes</td><td>PPPoE</td><td colspan="2" rowspan="2">PPPoE</td><td>PPPoE</td><td colspan="2" rowspan="2">PPPoE</td></tr>
<tr><td>PPP</td><td>no</td><td>PPPoA</td><td>-</td></tr>
<tr><td>PPTP</td><td>-</td><td>-</td><td colspan="2">-</td><td>-</td><td>-</td><td>PPTP</td></tr>
<tr><td colspan="8">You can choose between the protocol "ATM with Ethernet" or "ATM without Ethernet" using the ATM menu option.</td></tr>
<tr><td colspan="2"><code>ATM:</code></td><td colspan="6">Settings for asynchronous transfer mode</td></tr>
<tr><td colspan="2"><code>VPI/VCI</code></td><td colspan="6">VPI: Enter the virtual path identifier
VCI: Enter the virtual channel identifier
Ranges VPI: 0 to 255, VCI: 32 to 65535
Default: VPI: 1 and VCI: 32</td></tr>
<tr><td colspan="2"><code>Encapsulation</code></td><td colspan="6">Encapsulation of the transmitted packets: LLC or VC-MUX
Default: LLC</td></tr>
</table>

ATM with Ethernet	Determines whether Ethernet is used via ATM or not, see table above. Options: - No (PPPoA, IPoA) - Yes (PPPoE, EoA) Default: ***yes (PPPoE, EoA)***	
VLAN:	VLAN (Virtual Local Area Network)	
VLAN	VLAN mode	Determines whether VLAN may be used. Up to two VLANs can be used concurrently (2 VLAN tags (Q in Q)). Default: ***no VLAN***
	1. VLAN tag (C-VLAN), 2. VLAN tag (S-VLAN) (Q in Q)	
	ID:	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: 1. VLAN: ***7*** 2. VLAN: ***2***
		The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.
	Priority:	User priority information: One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority. Range: 0 to 7 Default (1. and 2. VLAN): ***0***

	TPID: Tag Protocol Identifier The TPID is a 16-bit sub-field within the 4-byte VLAN data field. This field contains the tag information defined by IEEE 802.1q. Default: VLAN 1: ***8100 hexadecimal*** VLAN 2: ***88A8 hexadecimal*** Note: When using two VLANS with layer 3 (IP) or layer 4, both are to be set to 8100.
`PPP profile:`	
`User name`	Entry of the user name (max. 100 characters) assigned by the carrier. The user name is entered using the number keys. Pressing the right softkey changes the meaning and thus influences the input via the number keys (letters (upper and lower case) and numbers).
`Password`	Entry of a password (max. 55 characters) assigned by the carrier; see "User name" for an explanation. During entry, the characters of the password are visible until Enter is pressed once. The characters are subsequently only displayed encrypted with "*".
`Set IP`	When "yes" is set, the IP address defined under IP/own IP address (see below) is used for connecting. Default: ***no***
`Current delay`	Once a PPP connection has been established, the test is only started after the preset delay time has elapsed. Range: 2 - 10 seconds Default: ***2***
`Profile name`	Enter the name of the PPP profile.
`PPTP`	PPP settings (Point-to-Point Tunnelling Protocol)
	Own server IP address Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0***

APN	APN settings (Access Point Name) **<Edit>** Edit the APN profile
Access point	Access point name (APN), gateway between mobile telephony network and data network. Default: ***/***
Dial-up name	Dial-up name: enter the dial-up number of the access point here. Default: ***99#**
Profile name	Enter the name of the APN profile.
IP version:	Internet Protocol version
	Determines which IP version is to be used. only IPv4: Internet Protocol version 4 acc. to RFC 791 only IPv6: Internet Protocol version 6 acc. to RFC 2460 Dual Stack IPv4/IPv6: If IPv6 is available, this protocol is preferred for a test.If not, ARGUS switches automatically to IPv4. Dual Stack Lite: Assigning a globally routable IPv6 address. Default: ***IPv4***
IPv4:	Internet Protocol version 4 configuration
IP mode	Definition of IP address assignment Static IP: Fixed IP address DHCP client: Assignment of IP address by server (remote side) DHCP server: Assignment of IP address by ARGUS DHCP auto: ARGUS checks for the presence of a DHCP server in the network. If a server is present, it assigns the IP address; if not, ARGUS does this. Default: ***DHCP client***
Own IP address	Own ARGUS IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
IP netmask	IP netmask Range: Range 0.0.0.0. to 255.255.255.255 Default: ***255.255.255.0*** (assignment see RFC 3330)

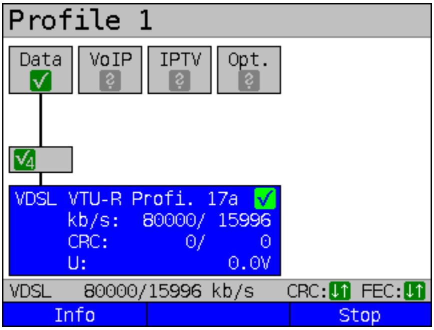
`Gateway IP`	Gateway IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
`DNS Server`	DNS server 1 DNS server 2 Entry of DNS server IP address (DNS = Domain Name System) Range: Range 0.0.0.0. to 255.255.255.255 Default: ***0.0.0.0*** (assignment see RFC 3330)
`DHCP client`	DHCP timeout: Range: 1 - 9999 seconds Default: ***20***
	DHCP Vendor ID: - Format: choose format: ASCII or hexadecimal ASCII data: Entry of DHCP vendor ID in ASCII format Default: ***ARGUS***, for details see "User name", page 109 - HEX data: entry of DHCP vendor ID in hexadecimal format, see MAC address page 92
	DHCP vendor info: - Format: choose format: ASCII or hexadecimal - ASCII data: Entry of DHCP vendor information in ASCII format, default: ***ARGUS***, for details see "User name", page 109 - HEX data: entry of DHCP vendor information in hexadecimal format, see MAC address page 92
	DHCP user class information - Format: choose format: ASCII or hexadecimal - ASCII data: entry of DHCP user class info in ASCII format Default: ***ARGUS***, for details see "User name", page 109 - HEX data: entry of DHCP user class information in hexadecimal format, see MAC address page 92

	DHCP user-defined option (generate a custom DHCP option) - Option number Range: 0 to 255 Default: ***255 = off*** - Format: choose format: ASCII or hexadecimal - ASCII data: entry of DHCP user-defined option in ASCII format Default: ***ARGUS***, for details see "User name", page 109 - HEX data Entry of DHCP user-defined option in hexadecimal format, see MAC address page 92	
DHCP server	Settings for the DHCP server: - Starting and ending IP address Range: Range 0.0.0.0. to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.10.30*** End: ***192.168.10.40*** - Domain name, see "User name" page 109 for details - Duration of reservation for IP addresses Range: 1 - 99999 seconds Default: ***240***	
IPv6:	Internet Protocol Version 6 settings	
AFTR	AFTR mode	Determines whether Address Family Transition Router (AFTR) mode is set automatically or statically. Default: ***Automatic***
	AFTR address	Entry of the AFTR address.
DHCP client	DHCP mode	Determines whether DHCPv6 is selected automatically or whether the Router Advertisement (RA) server is ignored. Default: ***Automatic***
	DHCP options	Determines whether the DHCPv6 options are automatically selected or all options requested. Default: ***Automatic***
	Enterprise Number (PEN)	Entry of PEN (Private Enterprise Number). Range: 0 to 65535 Default: ***46443***

BGP:	Border Gateway Protocol
Mode	Determines whether BGP is to be used. Default: ***off***
AS number	Defines the AS number (Autonomes System). Range: 1 to 65534 Default: ***1***
IP neighbour router	Determines whether the router´s IPv4 or IPv6 address is to be used. Default: ***IPv4 (0.0.0.0)***
AS number neighbour router	Determines the AS (autonomous system) number from the neighbour router. Range: 1 to 65534 Default: ***1***
TTL	Maximum number of hops over which the path to the destination address node is tracked. Range: 1 to 255 Default: ***1***
Connect Timeout	Maximum wait time for the response of a network node. Range: 1 to 300 seconds Default: ***10 seconds***
Data log	Data log on or off This function must be set to "on" so that a trace file can be sent to the PC; see page 82. After terminating a VL via the corresponding service or the physical layer, ARGUS queries whether the trace file should be sent to the PC. For example, when the data log is activated for VL 1, only VL 1 is recorded. When one VL is configured for multiple services and the data log is active, all data of this VL are recorded. Default: ***off***
Profile name	Enter the name of the VL profile. Enter the name as for the access name, see page 28.

9.5 Displaying protocol statistics

Depending on the access mode and the protocol, ARGUS displays BRAS, IP, PPP or Ethernet statistics.

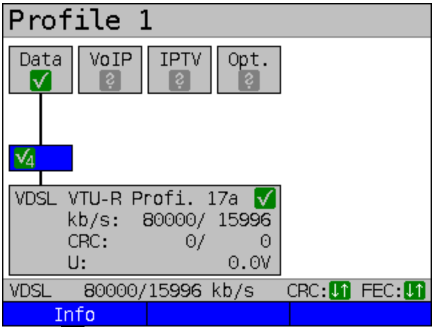


The physical layer, virtual line and service data are active.

<Info> Displays G.fast and DSL results.

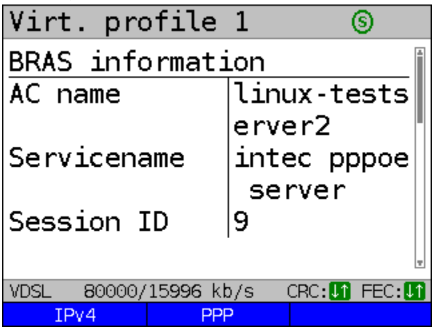
<Stop> Deactivates physical layer, VL and Data service.

Switch to the virtual line (VL) using the cursor keys.



Press one after another and

Display of ARGUS MAC addresses: Line, LAN, ETH, see also page 311 and following.

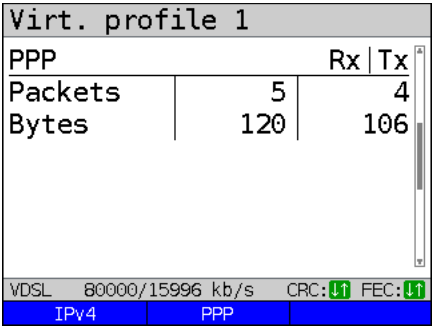


BRAS information:
For PPP protocol only, ARGUS displays the Broadband Access Server (BRAS) information:

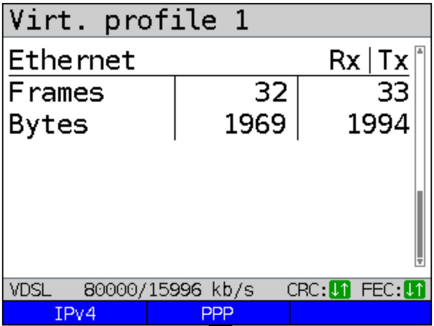
- AC (access server): name of server
- Service name name of service
- Session ID: number of the connection

<IPv4> Displays the configuration assigned by the server.

Continued on next page

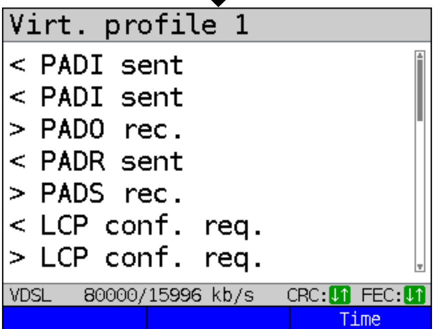


PPP information:
ARGUS displays the received (Rx) and transmitted (Tx) PPP packets and the bytes.



Ethernet information:
ARGUS displays the received (Rx) and transmitted (Tx) Ethernet frames and bytes.

<PPP> The softkey **<PPP>** opens a PPP trace, which displays the PPP login process.



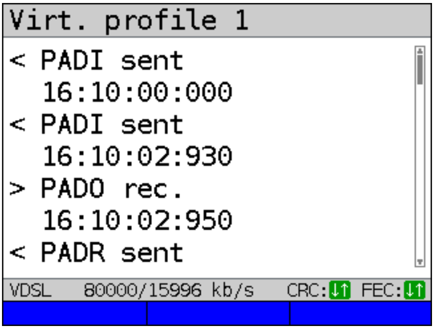
Command display

< = Command sent by ARGUS

> = Command sent by DSLAM

<Time> The **<Time>** softkey assigns the individual messages to times according to the ARGUS system clock.

Continued on next page

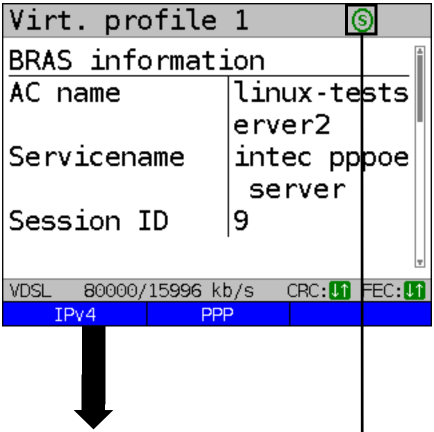


- PADI:
  PPPoE Active Discovery Initiation
- PADO:
  PPPoE Active Discovery Offer
- PADR:
  PPPoE Active Discovery Request
- PADS:
  PPPoE Active Discovery Session Confirmation
- PADT:
  PPPoE Active Discovery Termination
- IPv6 CP:
  IPv6 Control Protocol
- LCP:
  Link Control Protocol
- IPCP:
  Internet Protocol Control Protocol
- PAP:
  Password Authentication Protocol

Abbreviation meaning:

Abbreviation	Meaning
ack.	acknowledge
auth.	authentication
conf.	configuration
nak.	not acknowledge
prot.	protocol
rec.	received
rep.	reply
req.	request
rej.	rejected

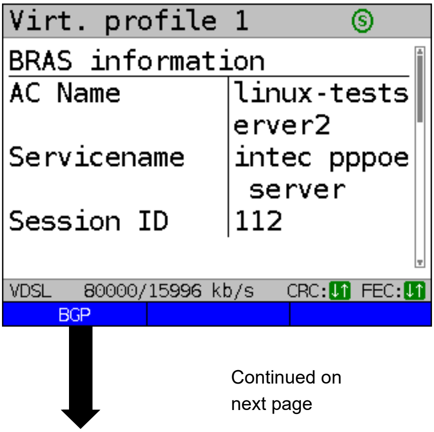
BGP information



<IPv4> Configuration assigned by the server is displayed, see page 119.

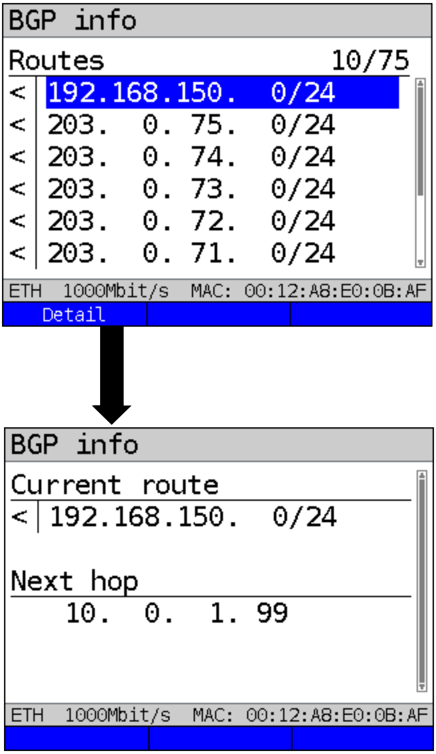
<PPP> PPP information is displayed.

Switches to softkey assignment.



<BGP> BGP information is displayed.

Continued on next page



ARGUS displays the first 10 out of a maximum of 4000 routes for the connection (in this example 10 through 75).

Display BGP info:

- IP addresses of the routes

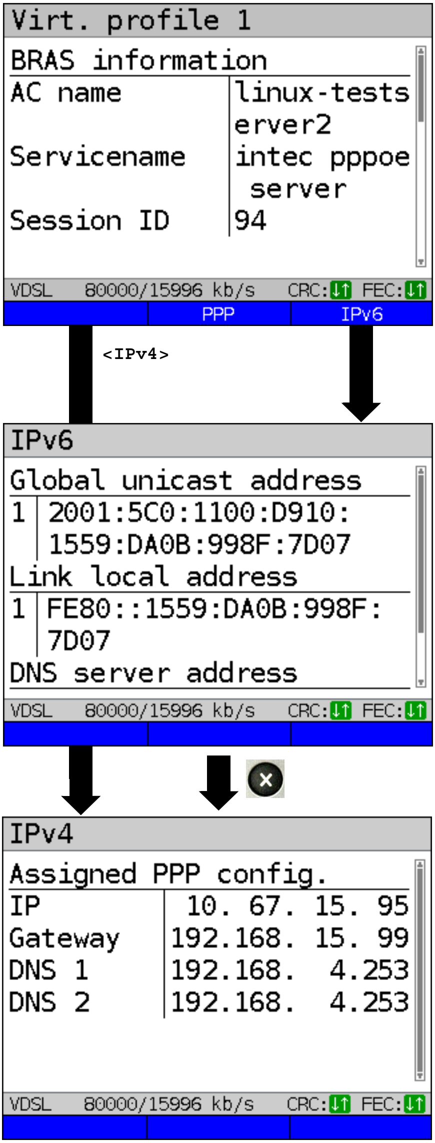
The display /24 refers to the netmask. This corresponds to the netmask 255.255.255.0.

<Detail> Displays the BGP information of the selected route.

Display BGP info:

- Current route (in this example 192.168.150. 0/24)
- Next hop (in this example 10.0.1.99)

IP information



IP version-dependent.

In this example IPv6:

<IPv6>	IPv6 information is displayed.
<IPv4>	IPv4 information is displayed (Softkey not visible in this example, as IPv6 was used).

Assigned configuration:
ARGUS displays the IP configuration assigned by the server:
- Global unicast address
- Link local address
- DNS server address

Use the cursor keys to display further information.

Exits results.

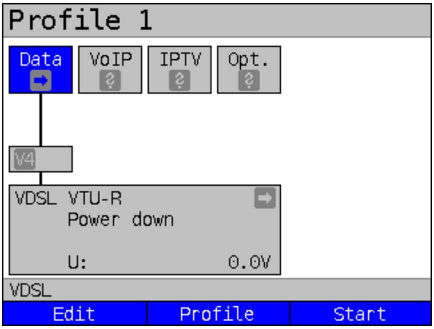
Assigned configuration:
ARGUS displays the IP configuration assigned by the server:
- Received IP address
- Gateway IP address
- Available DNS servers

Exits results.

10 Services + Tests

The status screen (see explanation page 97) shows four services.
Each service can be used to conduct an entire suite of IP tests (see list below). It is also possible to start and stop each service independently of the others.

Example screen with the possible services



<Edit> Assigns the service a VL profile and configures the service.

<Profile> Configures the profile.

<Start> Activates the service. If virtual lines and the physical layer are not active, they are also automatically started as well.

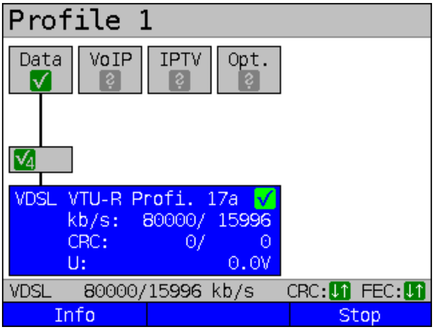
The meaning of the symbols, s. page 99.

Once a service is activated, a variety of tests can be started using **<Test>**.

Services:			
Data	VoIP	IPTV	Opt.
- IP ping	- IP ping	- IP ping	- IP ping
- Traceroute	- Traceroute	- Traceroute	- Traceroute
- HTTP download	- VoIP call	- IPTV	- HTTP download
- FTP download	- VoIP wait	- IPTV scan	- FTP download
- FTP upload	- VoIP call generator	- IPTV passive	- FTP upload
- FTP server			- FTP server
- Textbrowser			- Textbrowser
- Network scan*[1]			- Network scan*[1]
			- Video on demand
*[1] only Ethernet			

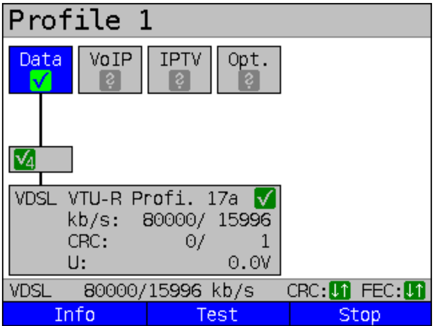
Possible tests that can be executed using the various services.

10.1 Displaying service statistics



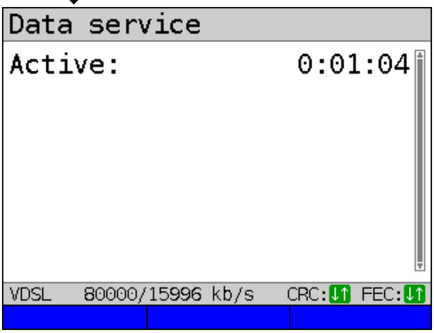
ARGUS in the status screen.
The physical layer, VL and service are active.

Switch to a service (in this example Data) using the cursor keys.



<Info> Displays the duration of activity of the selected service.

In the service VoIP, the VoIP call parameters are displayed here, see page 189.



Exit the display and return to the status screen.

11 Overview of tests and hotkey assignment

Overview of tests

Display of possible tests at the G.fast, xDSL and Ethernet interface:

Interface / Test	ATU-R VTU-R FTU-R	STU-R (only ATM + EFM)	STU-C (only ATM + EFM)	ATU-R BR VTU-R BR STU-R BR FTU-R BR	ATU-R RT VTU-R RT STU-R RT FTU-R RT	ETH	LTE
Copper Box	x*5	-	-	x*5	x*5	-	-
Loop see page 130	x*4	x	x	-	x*3	x	-
LTE scan see page 128	-	-	-	-	-	-	x
IP ping see page 137	x	x	x	-	x	x	x
Traceroute see page 143	x	x	-	-	x	x	x
HTTP download see page 147	x	x	-	-	x	x	x
FTP download see page 152	x	x	-	-	x	x	x
FTP upload see page 156	x	x	-	-	x	x	x
FTP server see page 160	x	x	x*1	-	x	x	-
Text browser see page 167	x	x	x*1	-	x	x	-
Network scan see page 171	-	-	-	-	-	x	-
VoIP call/wait see page 176	x	x	-	-	x	x	-
IPTV see page 199	x	x	-	-	x	x	-
IPTV scan see page 213	x	x	-	-	x	x	-

Interface / Test	ATU-R VTU-R FTU-R	STU-R (only ATM + EFM)	STU-C (only ATM + EFM)	ATU-R BR VTU-R BR STU-R BR FTU-R BR	ATU-R RT VTU-R RT STU-R RT FTU-R RT	ETH	LTE
IPTV passive see page 220	-	-	-	x*1	x	x	-
VoD see page 224	x	x	-	x	x*2	x	-

*1 = EFM only *2 = not for VDSL/G.fast *3 = only for SHDSL
*4 = only for VDSL/G.fast *5 = only for ADSL, VDSL and G.fast

A virtual line must be configured first before ARGUS can execute these texts (exception: loop). Configuration is described in the chapter "Virtual line", see page 97.

12 LTE

With the LTE function and an approved USB stick (including SIM card), ARGUS can scan all available networks (LTE scan) and determine their connection parameters. This also permits data tests to be carried out.

With the LTE function and an approved USB stick (including SIM card), ARGUS can scan all available networks (LTE scan) and determine their connection parameters. This also permits data tests to be carried out.

Insert a valid SIM card before using (not included in scope of supply). Attention: Be aware of any restriction on your data volume (particularly in download tests, data cut-offs can be reached quickly).

Do not use any other LTE stick with your ARGUS instrument other than the listed LTE sticks with the corresponding firmware version. Observe the manufacturer's operating and safety instructions.

Only operate your LTE stick within the specified parameters. Never store or transport your ARGUS instrument with the LTE stick plugged in (risk of destruction).

Do not use continuously on your ARGUS instrument. Use only antennas approved by the manufacturer.

12.1 LTE Settings

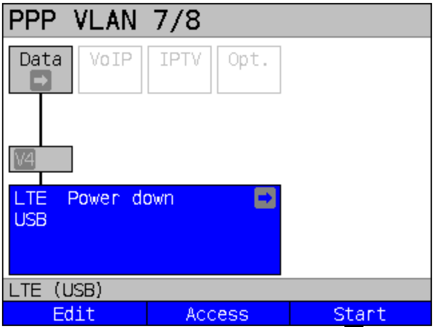
Please refer to page 43 for instructions on configuring the LTE interface.

Settings	Description
Preconfigured accesses	
Phys. parameters:	
LTE (USB):	
Frequency band	Sets the frequency band to be used for the LTE connection (800 MHz, 1600 MHz, 2600 MHz). Default: ***Automatic***
PIN	Entry of PIN (personal identification number) for the inserted SIM card. Up to eight characters are possible. Default: ****

See chapter 9 Virtual lines (VL) page 97 for further configurations.
See page 110 for APN configurations.

The PPP protocol must be selected in order to establish a virtual line.

12.2 Establishing LTE connection



ARGUS in status screen.

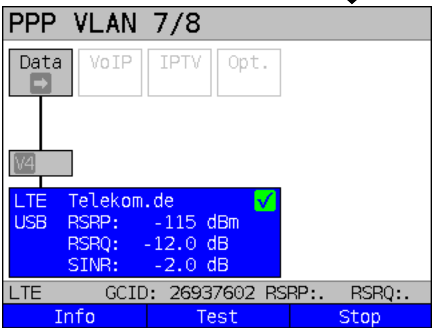
ARGUS uses the default profile (PPP VLAN 7/ in the example) to establish a LTE connection.

The test has not yet started!

Meaning of arrow in the layer-1 box:

Gray arrow	no test started
Yellow arrow	Test started
Green check mark	Connected

Establishing a LTE connection

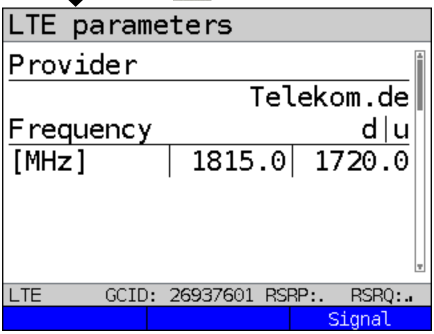


Display:

- Provider
- Current LTE parameters
- Current Cell ID (GCID)

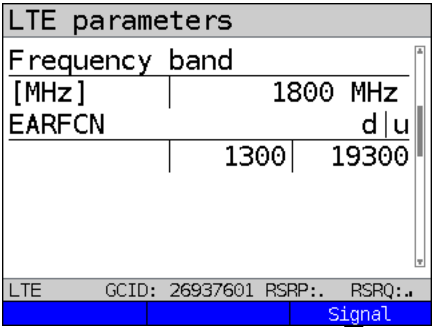
<Info>	Display LTE connections parametertes
<Test>	Displays the available tests.
<Stop>	Stops the LTE connection

or



Display:

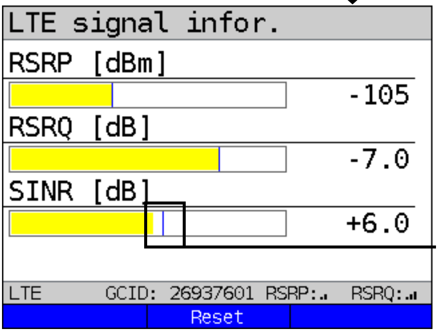
- Provider
- Used frequency (down- and upstream)



Display:

- Used frequency band
- EARFC (down-/upload)
- Current signal strength in dBm (RSRP)
- Current signal quality in dB (RSRQ)
- Current signal attenuation in dB (SINR)
- Codecs in IDs

Open LTE signal information:



Display:

- Current signal strength in dBm (RSRP)
- Current signal quality in dB (RSRQ)
- Current Signal to noise ratio in dB (SINR)

The maximum determined for the parameter is indicated by a marker.

<Reset> Resets the maximum marker.

For establishing virtual lines and displaying and controlling data tests, e.g. IP ping on page 97 und page 137.

Disconnect from the LTE connection and saving test restults

You can disconnect and save the results from an LTE connection as described for VDSL, see page 82

Saving test results without terminating the LTE connection

You can save your results of the LTE connection without disconnecting in the same way as for VDSL, see page 83

Meaning of the displayed colours of the LTE parameters:

RSRP	Signal strength	Colour scheme
0 bars	< -125 dBm	red
1 bars	-125 dBm up to -105 dBm	red
2 bars	-105 dBm up to -95 dBm	yellow
3 bars	-95 dBm up to -80 dBm	yellow
4 bars	-80 dBm up to -65 dBm	green
5 bars	>-65 dBm	green

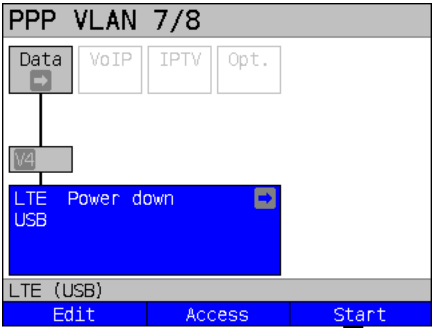
RSRQ	Signal quality	Colour scheme
0 bars	< -15 dB	red
1 bars	-15 dB up to -11 dB	red
2 bars	-11 dB up to -8 dB	yellow
3 bars	-8 dB up to -5 dB	yellow
4 bars	-5 dB up to -3 dB	green
5 bars	>-3 dB	green

SINR	Signal to noise ratio	Colour scheme
	-12 dB up to -5 dB	red
	-5 dB up to -1 dB	red
	-1 dB up to 4 dB	yellow
	4 dB up to 9 dB	yellow
	9 dB up to 19 dB	green
	19 dB up to 40 dB	green

12.3 LTE scan

The LTE scan scans all available carriers and frequency bands.

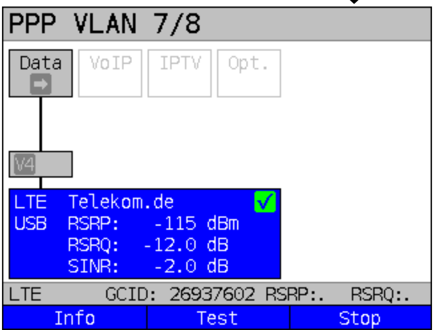
12.3.1 Start LTE scan



ARGUS status screen.

Establising LTE connection.

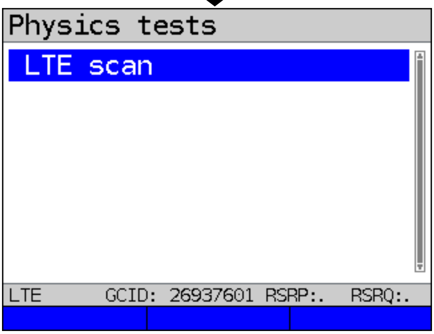
<Start> Activates LTE



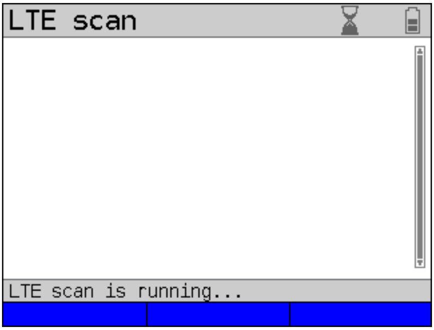
<Info> Displays the LTE connection parameters, see page 125.

<Test> Displays the available tests.

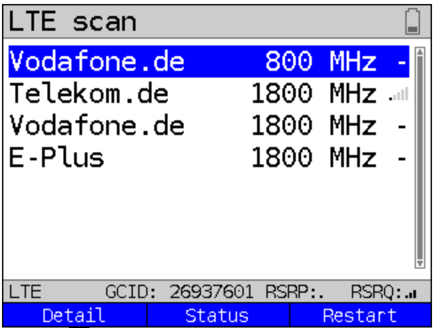
<Stopp> Stops LTE connection.



Continued on next page

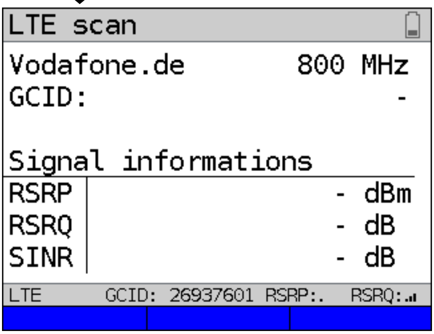


The LTE scan executes.
This can take a few seconds. The scan is completed when the hourglass disappears from the status display.



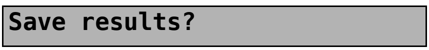
ARGUS displays all available carriers and frequency bands.

The detail information such as signal strength, signal quality and signal-to-noise ratio can only be displayed for the carriers enabled for that SIM card.



For details and evaluation of the connection parameters, see page 125 and the following.

Exits results.



Saves the LTE scan results (see also IP ping on page 142).

13 Loop

A loop can be created on an SHDSL line (in EFM or ATM mode) and on Ethernet.
In a loop, all incoming Ethernet frames on layer 1 (L1) are returned to the sender unchanged.
In a loop on layer 2 (L2) of the OSI model, ARGUS swaps the source MAC address for the destination MAC address and then returns all Ethernet frames.

The loop requires the following parameters:

Protocol-independent parameters
The opening of test parameters is described in the chapter "Configuring accesses", see page 35.

Setting	Description
Test parameter:	
Loop	
Layer 1	This setting determines what layer of the OSI model the loop runs on. - L1: all incoming Ethernet frames on a loop on layer 1 (L1) are returned to the sender unaltered. - L2: on a loop on layer 2 of the OSI model, ARGUS exchanges the source MAC address with the destination MAC address and returns all incoming Ethernet frames. - L3: on a loop on layer 3 (L3) of the OSI model, ARGUS exchanges the destination and own IP address as well as the MAC addresses and then returns all incoming Ethernet frames. Default: ***L2***

<table>
<tr><td rowspan="5"><code>Layer 2</code></td><td>MAC mode</td><td colspan="3">You can use the loop MAC mode to determine what gets looped.
- For own MAC only (promiscuous mode off)
L1: only packets for the own MAC address and broadcast packets are looped.
L2: only packets for the own MAC address are looped. Broadcasts are rejected.
L3: only packets for the own MAC address and own IP address are looped. Broadcasts are rejected.
- Loop everything (promiscuous mode on)
L1: all packets (including broadcast) are looped.
L2: all packets - except broadcasts - are looped. Broadcasts are rejected.
L3: all packets for which the IP address has been recognised are looped.
Default: for own MAC only</td></tr>
<tr><td>own VPI/ VCI</td><td colspan="3">Determines whether the loop is to be executed using a separate VPI/VCI pair.</td></tr>
<tr><td rowspan="3">own VLAN</td><td colspan="3">Determines whether the loop is to be executed using a separate VLAN.</td></tr>
<tr><td>VLAN mode</td><td colspan="2">Determines whether VLAN may be used. Up to two VLANs can be used concurrently.
Default: no VLAN</td></tr>
<tr><td>1. VLAN (C-VLAN)</td><td>ID</td><td>Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs.
Range: from 0 to 4095
Default: 2

The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.</td></tr>
</table>

				Priority	User priority information: One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority. Range: 0 to 7 Default: ***0***	
				TPID	8100 Hex	The VLAN TPID 8100 hex is a 16-bit field that identifies frames according to IEEE 802.1Q (VLAN-tagged frame). It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).
					88A8 Hex	VLAN TPID 88A8 supports provider bridging according to IEEE 802.ad. It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).
					Default: ***8100 Hex***	
			2. VLAN (S-VLAN)	ID	Identifier for the VLAN to which the frame belongs. Every VLAN is assigned a unique number, the VLAN ID. A device that belongs to the VLAN with ID = 2 can communicate with every other device in the same VLAN but not with devices in other VLANs. Range: from 0 to 4095 Default: ***2***	
					The IDs 0, 1 and 4095 are reserved for management purposes and should preferably not be used.	

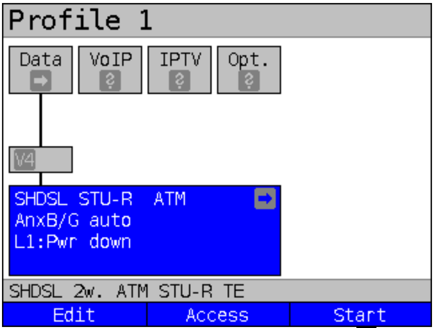
<table>
<tr><td rowspan="3"></td><td rowspan="3"></td><td rowspan="3"></td><td>Priority</td><td colspan="2">User priority information:
One of eight (3-bit) priorities can be specified for each frame. This makes it possible e.g. to give priority to transmitting speech data while treating HTTP data with lower priority.
Range: 0 to 7
Default: 0</td></tr>
<tr><td rowspan="2">TPID</td><td>8100 Hex</td><td>The VLAN TPID 8100 hex is a 16-bit field that identifies frames according to IEEE 802.1Q (VLAN-tagged frame). It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).</td></tr>
<tr><td>88A8 Hex</td><td>VLAN TPID 88A8 supports provider bridging according to IEEE 802.ad. It also makes it possible to use all network paths actively according to IEEE 802.aq (shortest path bridging, SPB).

Default: 88A8 Hex</td></tr>
<tr><td rowspan="4"><code>Layer 3</code></td><td>IP version</td><td colspan="4">Determines which IP version is to be used.
IPv4: Internet Protocol version 4 acc. to RFC 791
IPv6: Internet Protocol version 6 acc. to RFC 2460
Default: IPv4</td></tr>
<tr><td>Own IP mode</td><td colspan="4">For IP address assignment, this determines whether a static IP address is to be used or whether a server (remote station) issues the IP address (DHCP client).
Default: Static IP</td></tr>
<tr><td>Own IP address</td><td colspan="4">Own ARGUS IP address
Range: Range 0.0.0.0. to 255.255.255.255
Default: 0.0.0.0 (assignment see RFC 3330)</td></tr>
<tr><td>⚠</td><td colspan="4">The layer-2 settings are also relevant when conducting a layer-3 loop. Even if only layer 3 is selected, you may need to configure layer-2 settings.</td></tr>
</table>

Notes for the use of VLANs

	Contains received Ethernet packets:		
VLAN mode	no VLAN	one VLAN	two VLANs
No VLAN	x	x	x
1. VLAN tag (C-VLAN)	-	ARGUS loops when the VLAN IDs and TPIDs contained in Ethernet packets agree with the VLAN 1 settings.	ARGUS loops when the first VLAN ID (also called outer or service ID) and TPID contained in Ethernet packets agree with the VLAN 1 settings.
1. VLAN tag (C-VLAN) and 2. VLAN tag (S-VLAN)	-	-	ARGUS loops when the first VLAN ID (also called outer or service ID) and TPID contained in Ethernet packets agree with the VLAN 2 settings and the second VLAN ID (also called the inner or customer ID) and TPID agree with the VLAN 1 settings.
- = ARGUS does not loop. x = ARGUS loops regardless of whether the received Ethernet packets contain VLANs.			

Starting the loop (access mode: SHDSL STU-R ATM)

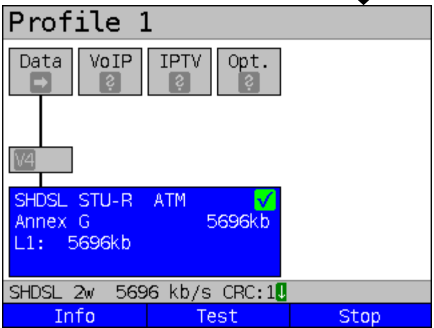


ARGUS in status screen.

Establishing the SHDSL connection

The profile shown in the display (profile 1 in this example) is used for the loop.

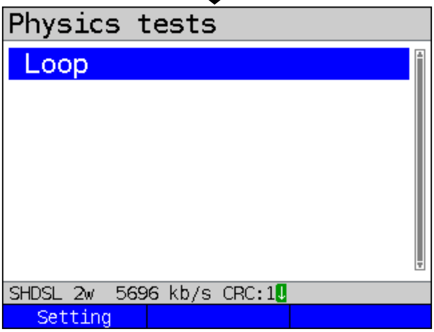
<Start> Activates SHDSL.



<Info> Displays SHDSL connection parameters.

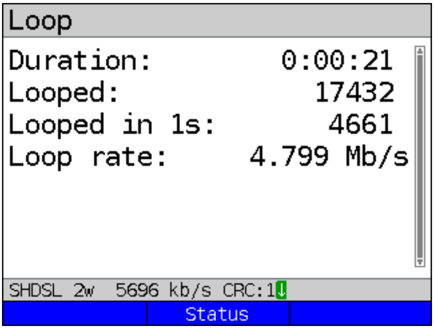
<Test> Displays the available tests.

<Stop> Stops SHDSL connection.



<Setting> Changes loop parameters, see page 130.

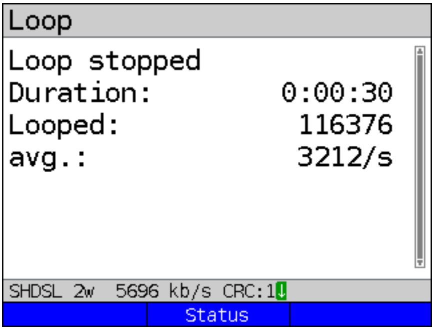
Continued on next page



The loop is started:

`Duration`	Current duration of test
`Looped`	Number of packets looped so far
`Looped in 1s`	Number of packets looped in the current second
`Loop rate`	Displays the current data rate per second.
`MAC address`	Own MAC address of looping device (e.g. for entry in the traffic generator).

`<Status>`	Displays status screen without ending the test.



`Duration`	Overall duration of test.
`Looped`	Number of looped packets.
`avg.`	Number of looped packets per second.

`<Status>`	Display of status screen.

⚠ Connection statistics are not recorded during the loop tests (in SHDSL access). ARGUS resumes saving of these statistics when the test is ended.

⚠ Connection statistics are not recorded during the loop tests (in SHDSL access). ARGUS resumes saving of these statistics when the test is ended.

Saving the results

You can save the results for the loop test in the same way as for VDSL, see page 82.

14 IP tests

14.1 IP ping

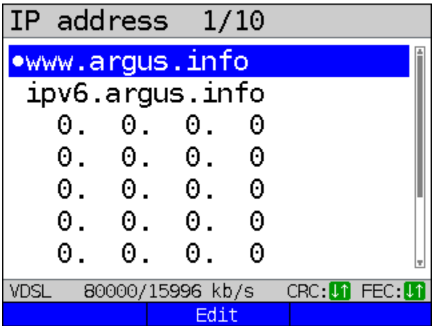
In IP ping, ARGUS tests whether a connection exists via Ethernet, G.fast or xDSL using a DSLAM and whether the ATM/IP network to the internet service provider (ISP) or another computer or server address is possible. ARGUS sends a test packet to a specified IP address (remote station) and waits for a response packet. On the basis of the received response packet, is it possible to draw conclusions as to the availability and delay of the ATM/IP network. It is also possible to measure the maximum data packet size of the path.

The IP ping the following parameters:

Protocol-independent parameters

The opening of test parameters is described in the chapter "Configuring accesses", see page 35.

Setting	Description
Test parameters:	
IP ping:	
`IP address`	Address of remote station. ARGUS can store up to 10 IP addresses. The stored IP addresses are available in all profiles.



ARGUS displays the ten available slots for IP addresses. Mark the line with the IP address you wish to edit using the cursor keys (in this example the first slot is marked (1/10)).

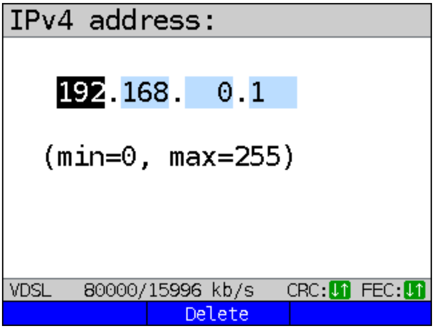
`<Edit>` Edits the selected IP address.

● as name, IPv4 or IPv6 number

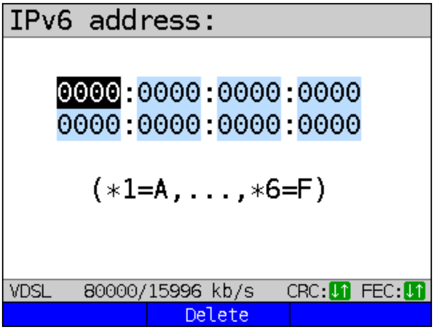
The address can be saved in the form of an IPv4 number, IPv6 number or a name.
Default: ***www.argus.info***

Continued on next page

IP address as IPv4 number



IP address as IPv6 number



You can use square brackets to include port information with IPv6 addresses in "IP address as name".

Enter the IPv4 or IPv6 address as a number. The editable area is highlighted in blue. Enter the address using the number keys.

`<Delete>` Deletes the place in front of the cursor.

 to  When entering an IPv6 address, the letters A-F are available using these key combinations.

 Adopts the marked IP address as the default.

Toggle entry using the softkey (right softkey changes the meaning when pressed). Enters the address as name, see user name page 109.

`<Ab>AB>` Entry begins with upper-case letters and continues in lower-case.

`<AB>12>` Entry of upper-case letters.

`<12>ab>` Numerical entry.

`<ab>AB>` Entry of lower-case letters.

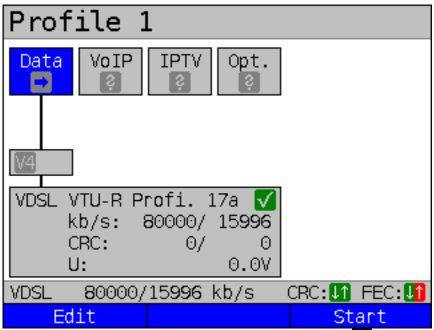
 or  Entry of special characters, e.g. @, /, -, . or _, :, ~, +, ...

 Moves the cursor in the display line

`Number of pings`	Enter the number of pings that ARGUS sends to the IP address. When 0 is set ARGUS sends continuously until the test is cancelled manually. Range: 1 to 99999 Default: ***10***
`Pause`	Defines a pause between two test packets. Range: 0.1 - 9.9 seconds Default: ***1 second***
`Packet size`	Sets the size of the test packet. You can determine the maximum packet size and the response time as as function of size by varying the packet size. Range: 36 to 55,555 bytes Default: ***84 bytes***

`Fragmentation`	Sets the fragmentation Default: ***on***	
	`on`	Test packets may be fragmented into multiple packets depending on the network (or router).
	`off`	Fragmentation prohibited, i.e. the test packets may be rejected by the network (or routers) (ARGUS does not receive a response packet).
	`auto`	ARGUS determines the maximum packet size of the path to the destination address (path MTU) and fragments the test packets so that the packets are transmitted with minimum delay (no fragmentation by the network/router necessary).

Starting IP ping (example access mode VTU-R, already active):

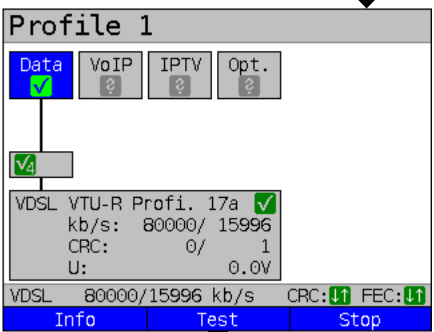


Establishing the service

The profile shown in the display (profile 1 in this example) is used for the IP ping.

`<Edit>` A virtual line is allocated to the service Data.

If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 57).



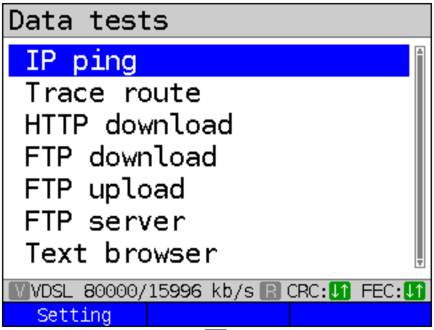
The service Data and the VDSL connection are active.

`<Info>` Duration of activation.

`<Test>` Opens test selection.

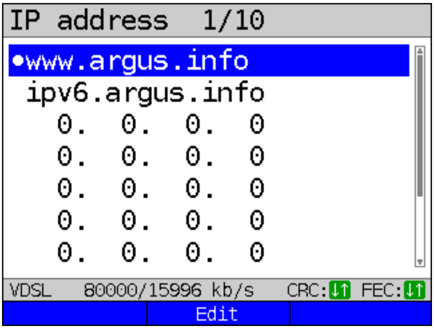
`<Stop>` Deactivates the service.

Continued on next page



e.g. select IP ping

<Setting> Changes IP ping parameters, see page 137.



ARGUS displays the addresses stored in the protocol.

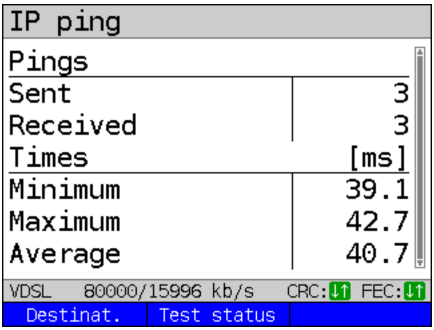
Select the address for the ping; the default is indicated with ●.

<Edit> Edits the address, see page 137.

In this example a ping test is conducted with IP version IPv4. Use with IPv6 is analogous.

The IP ping starts automatically.

IP ping



Display during the IP ping test:

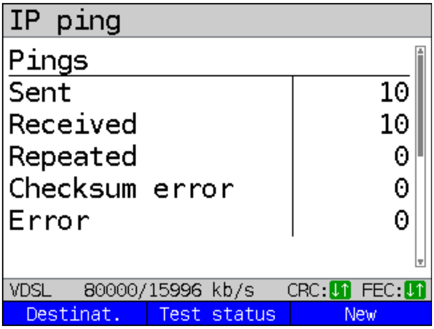
- Number of test packets sent
- Number of response packets
- Minimum time in ms
- Maximum time in ms
- Average time in ms

<Destination address> Display of URL and IP address.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

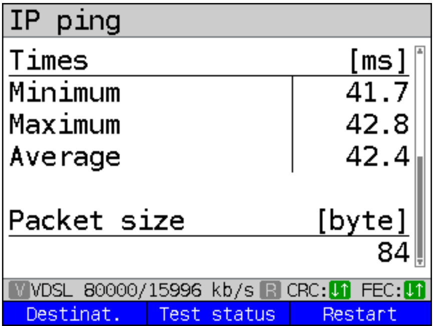
Cancels test
ARGUS displays the test results acquired up to this point and offers you the option of saving them (automatic prompt); see page 142.

IP ping result

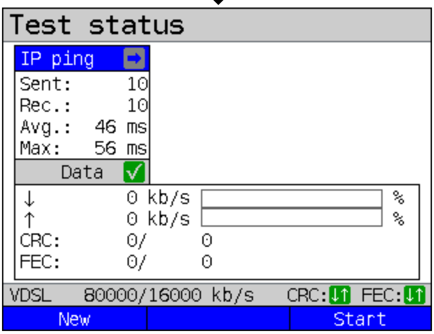


ARGUS displays the results when the test is finished:

- Number of packets sent
- Number of packets received
- Number of packets repeated
- Checksum errors
- Number of packets received with error
- Minimum packet response time in ms
- Maximum packet response time in ms
- Average packet response time in ms



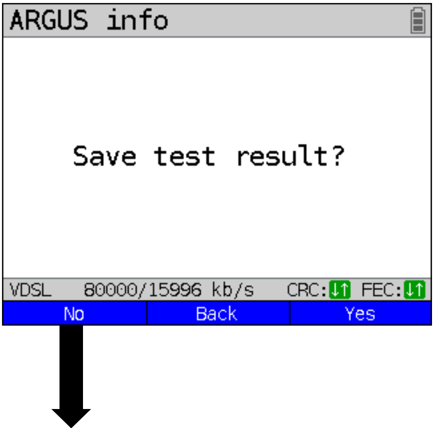
<Destination address>	Displays the URL and the IP address.
<Test status>	Displays test status without ending the test or starting a new test, see page 232.
<New>	Starts a new IP ping test.



Display of test status:
You can observe the running test or start a new test here, see page 232.

<New>	Selects a new single test.
<Stop>	Stops the IP ping test.
Shift	Press shift:
<Stop all>	Stops all active tests.
<Finish all>	Finishes all test.

2x Continued on next page

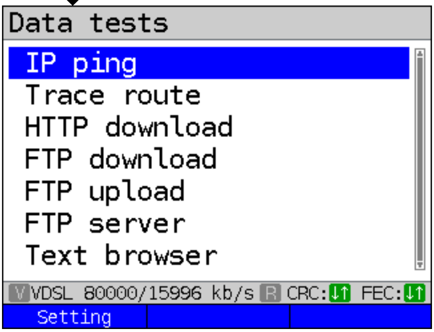


`<Yes>` ARGUS saves the result of the IP ping test to the first free storage slot in internal memory (see page 281).

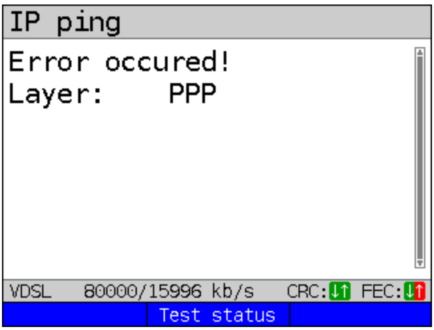
`<Back>` ARGUS returns to the test result without saving results.

`<No>` ARGUS returns to the last selection menu without saving results.

Sends trace file to PC, see page 113



A new test can be started as needed. The xDSL link and the service are still connected (the connection can be disconnected in the status screen with `<Stop>`).



Error messages in IP ping

ARGUS displays an error message as soon as an error occurs.

`<Test status>` Display of status screen.

For a description of error messages, see the Appendix, page 318 et seq.

14.2 Traceroute

In IP traceroute, ARGUS sends test packets and displays all hops and their response times on the way to the destination address. This data enables precise localisation of possible delays in the network.
The following parameters must be saved in the profile for the IP traceroute:

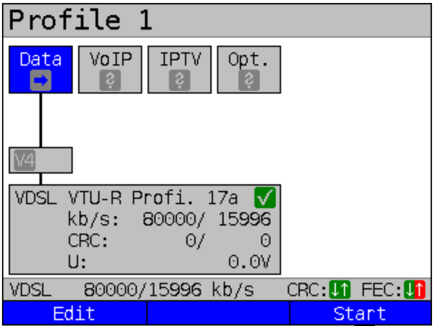
Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 35.

Setting	Description
Test parameters:	
Traceroute:	
IP address	The IP address of a destination node can be entered as either an IP number or a name (URL), see IP ping/IP address for instructions, page 138. Default: ***www.argus.info***
Maximum hops	Maximum number of hops over which the path to the destination address node is tracked. Range: 1 to 25 Default: ***25***
Probes	Number of attempts to address a network node. Range: 1 to 10 Default: ***3***
Timeout	Maximum wait time for the response of a network node. Range: 0.05 - 9.9 seconds Default: ***3 seconds***

Starting traceroute

(Example: access mode VTU-R, already active)

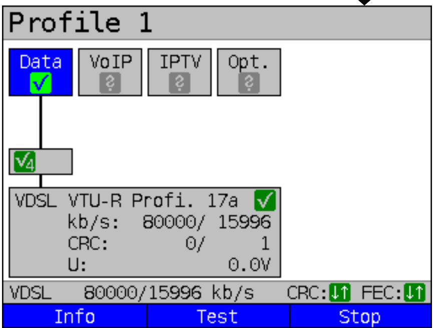


Connecting the service.

The profile shown in the display (profile 1 in this example) is used for the traceroute test.

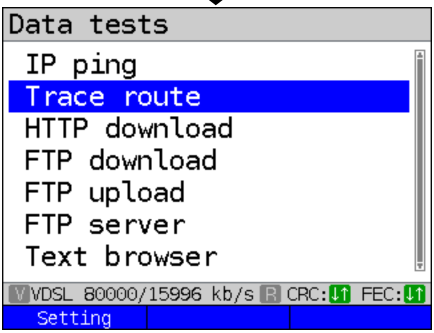
`<Edit>`	A virtual line is assigned to the service Data.

If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 57).



The service Data and the VDSL connection are active.

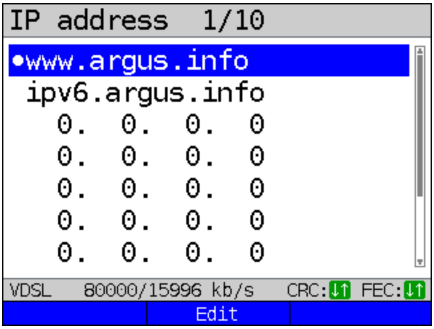
`<Info>`	Duration of activation.
`<Test>`	Opens test selection.
`<Stop>`	Deactivates the service.



e.g. select Trace route

`<Setting>`	Changes traceroute parameters, see page 143.

Continued on next page



ARGUS displays the IP addresses or URLs saved in the protocol.

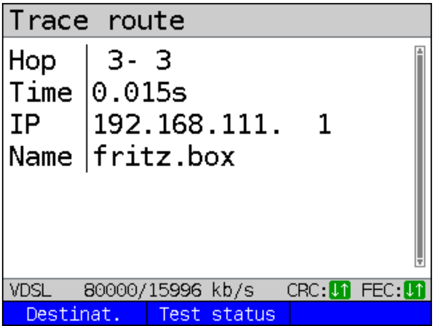
Select the address for the traceroute test; the default is indicated with ●.

<Edit> Edits the address, see page 137 for instructions.

In this example a traceroute test is conducted with IP version IPv4. Use with IPv6 is analogous.

The traceroute test starts automatically.

Traceroute



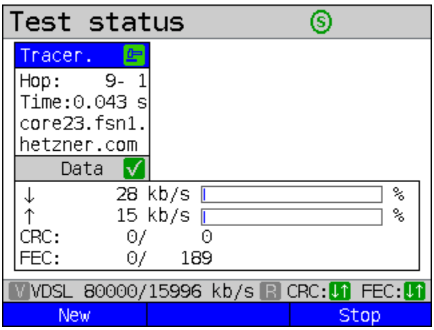
Display during the traceroute test:

- Current hop and attempt ("probe"), in this example:
  3 - 3: i.e. 3 hops and 3rd attempt.
- Response time of hop for current attempt (0.015 seconds).
- IP address of current hop, in this example 192.168.111.1 with name where applicable.

<Destinat.> Display of URL and IP address.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

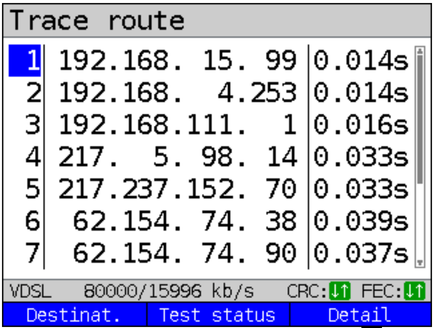
Cancels test
Displays the test results up to this point, with possibility of saving (automatic prompt).



Display of test status:
You can observe the running test or start a new test here, see page 232.

<New>	Selects a new single test.
<Stop>	Stops the traceroute test.
<Stop all>	Stops all active tests.
<Finish all>	Finishes all test.

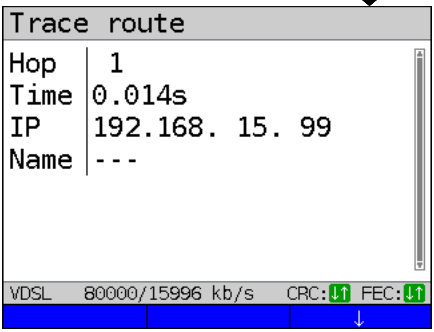
Traceroute result



Display after end of traceroute:

- All hops and their response times are displayed.

`<Detail>` Displays the name of the IP address of the hop (if possible). The details of the hop at the top of the list are displayed (in this example hop 1).



`<↓>` Switches to next hop, in this example hop 2.

`<↑>` Switches to previous hop.

Exits results.

Saves the traceroute results (see also IP ping, page 142).
Sends trace file to PC, see page 113.

14.3 HTTP download

In HTTP download, ARGUS downloads the data of a website or file. ARGUS displays the current "net download rate", the usable data of the IP packets, and following conclusion of HTTP download the average speed (for multiple download attempts).
The following parameters must be saved in the profile for the HTTP download:

⚠ It is not possible to obtain meaningful speed values for download tests with a duration of less than 10 seconds; therefore you should download as large a file as you can (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 35.

Setting	Description
`Test parameters:`	
`HTTP download:`	
`Server profile:`	You can create up to 15 user-defined server profiles that can be used for HTTP and FTP download and FTP upload. The profiles contain all parameters for HTTP and FTP download and FTP upload.
`Server address`	Entry of server address or URL of the server from which ARGUS downloads the file. For upload test: entry of upload destination address (server address) to which ARGUS sends the file. See page 137 for information on using the softkeys.
`Download file name`	Name of the file with the data that ARGUS downloads for tests (HTTP download and FTP download). Observe the notes for www alias addresses! (see page 148). If a specific port is required please enter it into the server address. See page 137 for information on using the softkeys.
`Upload file name`	Entry of the file name under which the file sent to the server in the FTP upload test is stored. Default: ***file***
`Upload file size`	Sets the size of the file that ARGUS sends in FTP upload. Range: 0 to 1000 Mbyte Default: ***100 MByte***

User name	Name of the user for the (FTTP, HTTP) file server. See page 137 for instructions
Password	Password entry for the (FTTP, HTTP) file server (max. 40 characters). See page 137 for instructions
Number	Number of times ARGUS downloads the file in the download test. For upload test: number of times ARGUS uploads the file in the upload test. "Zero" means infinite: the test continues until stopped manually. Range: 0 to 9,999 bytes (0=infinite) Default: ***3***
No. parall. down.	Number of packets into which the requested download is fragmented and simultaneously downloaded (see below). Range: 1 to 10 Default: ***3***
Profile name	Enters a name for the profile.

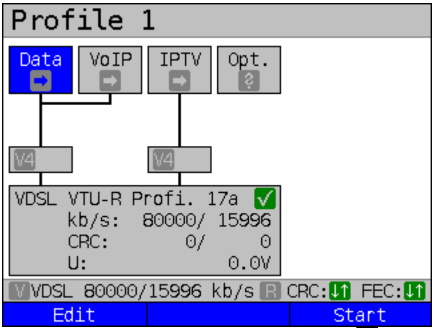
⚠ If a www alias address is entered as the "Source/destination address", ARGUS downloads "only" the HTML page in HTML download. ARGUS does not evaluate the HTML code, so that any link to a "real" www address is not considered. In this case, ARGUS does not indicate an error, as the HTML page of the specified "Source/destination address" was loaded without error.

⚠ When entering the "Source" address (server address and download file name), be sure to observe the correct capitalisation; otherwise ARGUS will return error 301 (Moved Permanently) or 404 (Not Found).

⚠ When requesting multiple download components, ARGUS may reduce the number of downloads depending on the server support, which can cause deviations from the set parameters. This can occur e.g. as soon as the size of the requested file is unknown.

⚠ If the download file name exceeds the maximum permissible length, you can work around this limit by fragmenting the address and additionally using the "Server" field.
The server name may be up to 80 characters long, the file name 60 characters long.

Starting HTTP download (example: access mode VTU-R, already active)

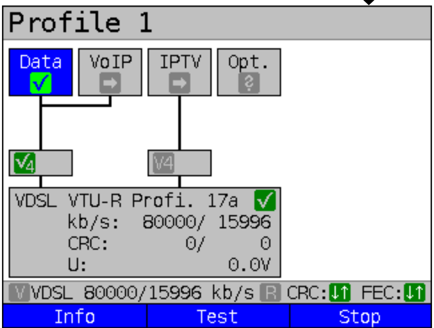


Connecting the service.

The profile shown in the display (profile 1 in this example) is used for HTTP download.

<Edit> A virtual line is added to the service Data.

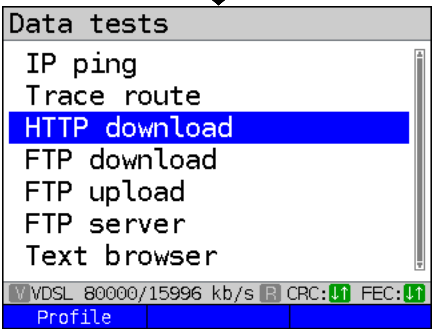
If no connection is established, ARGUS automatically connects at this point using the default profile (see page 57).



<Info> Duration of activation.

<Test> Opens test selection.

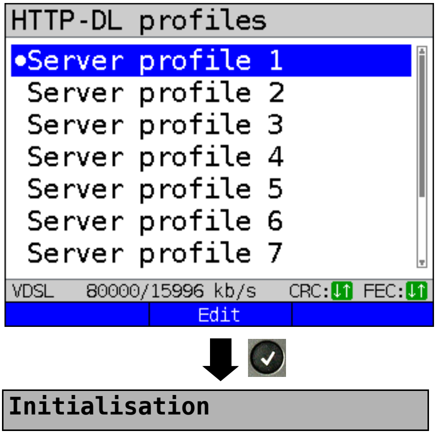
<Stop> Deactivates the service.



e.g. select HTTP download

<Profile> Displays the available HTTP download profiles.

Continued on next page



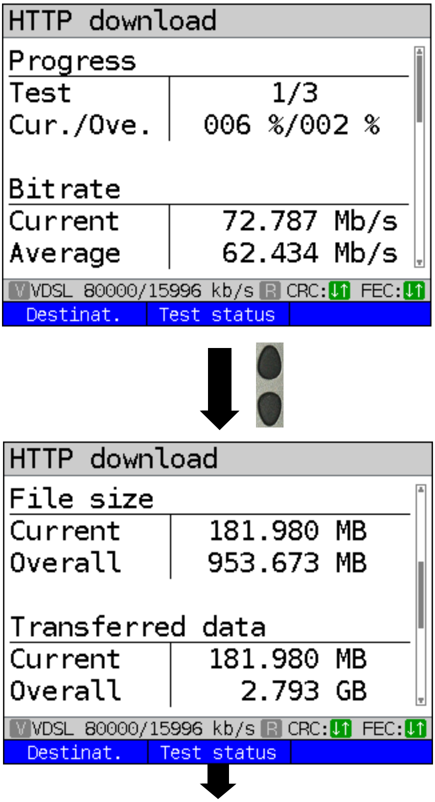
Mark the server profile:
(default is indicated with ●).

The server profiles are also used for FTP download and FTP upload.

`<Edit>` Edits the marked profile, see page 147 for changes to the individual settings.

HTTP download starts automatically.

HTTP download

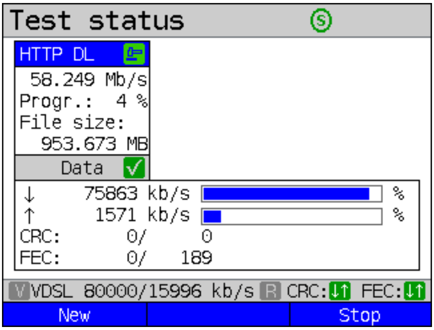


Display during HTTP download:

- Current download/total number of downloads, in this example the first download attempt out of three (1/3) is displayed.
- Data already transferred (current / overall) (in this example 6 % / 2 %).
- Current net download rate (in this example 72,787 Mbit/s).
- Current net average download rate (in this example 62,434 Mbit/s).
- Bytes transferred so far (in this example 181,980 MB).
- Size of file to be downloaded (in this example 953,673 MB).
- Current and overall transferred data
- Transfer time so far in h:min:s.
- Remaining transfer time in h:min:s.
- Number of parallel downloads.

`<Test status>` Displays test status without ending the test or starting a new test, see page 232.

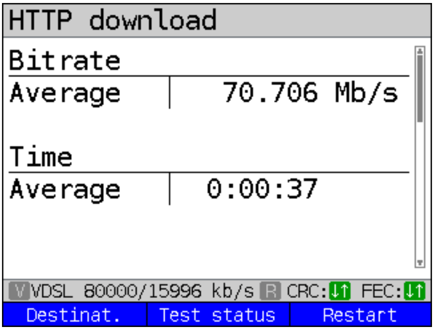
Cancels test.



Display of test status:
You can observe the running test or start a new test here, see page 232.

<New>	Selects a new single test.
<Stop>	Stops HTTP download test.
	Press shift:
<Stop all>	Stops all active tests.
<Finish all>	Finishes all test.

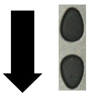
HTTP download result

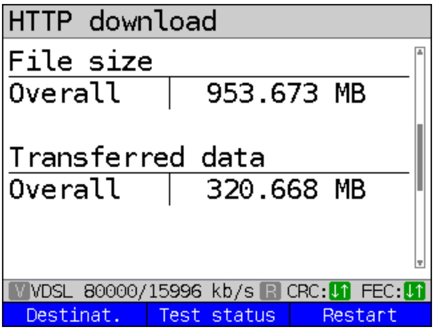


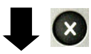
<Test status>	Displays test status without ending the test or starting a new test, see page 232.
<New>	Starts a new HTTP download.

Display of results:

- Calculated average speed of all downloads (in this example 70,706 Mbit/s).
- Average time required for a download in h:min:s.
- Transferred file size (in this example 953,673 MB).
- Maximum parallel downloads.
- Configured parallel downloads.







Exits results.

Saves HTTP download result, see page 141.
Sends trace file to PC, see page 113

14.4 FTP download

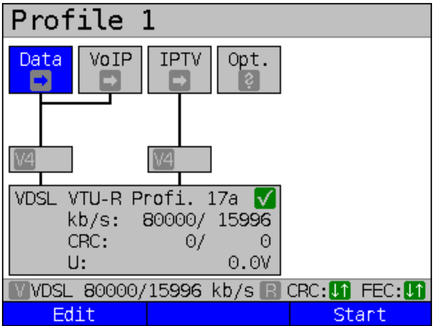
In FTP download, ARGUS downloads data in the form of a file. ARGUS displays the current net download rate, the usable data of the IP packets, and following conclusion of test the average speed (for multiple download attempts).

⚠ No meaningful evaluations are possible for download tests with a duration of less than 10 seconds. Therefore, the download file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 35. See page 147 HTTP download for an explanation of the test parameters.

Starting FTP download (example: access mode VTU-R, already active)

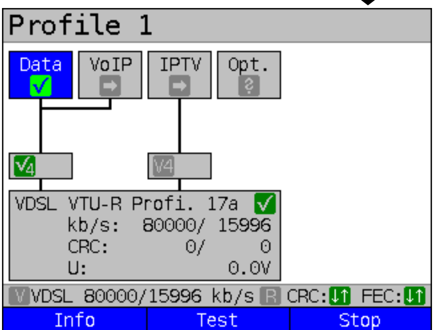


Connecting the service.

The profile shown in the display (profile 1 in this example) is used for FTP download.

<Edit> A virtual line is added to the service Data.

If no connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

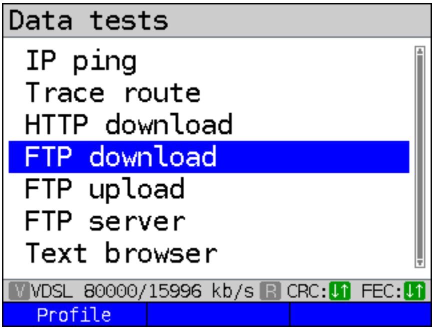


<Info> Duration of activation.

<Test> Opens test selection.

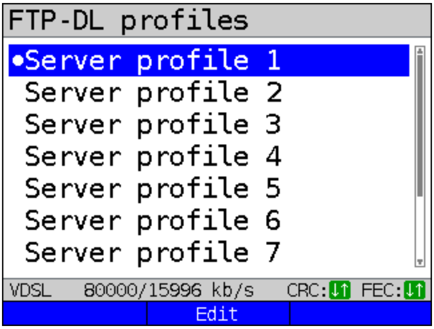
<Stop> Deactivates the service.

Continued on next page



e.g. FTP download

<Profile> Displays the available FTP download profiles.



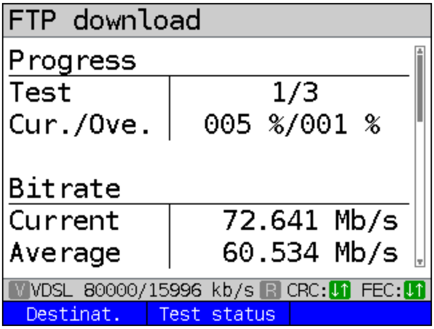
Mark the server profile (default is indicated with ●).

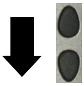
The server profiles are also used for HTTP download and FTP upload.

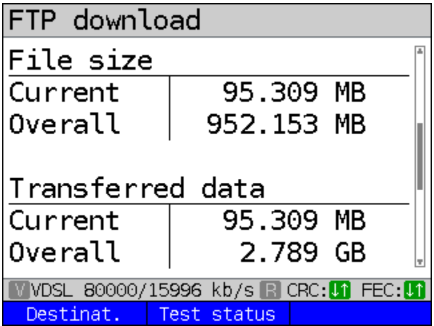
<Edit> Edits the marked profile, see page 147 for changes to the individual parameters.

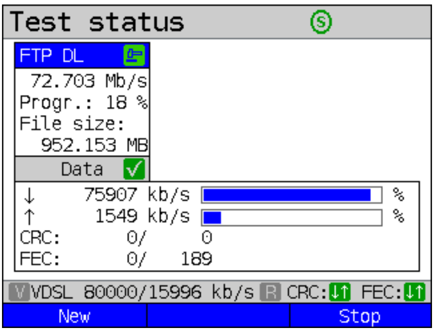
FTP download starts automatically.

FTP download









Display during FTP download:

- Current download/total number of downloads, in this example the first download out of three (1/3) is displayed.
- Data already transferred so far (current / overall (in this example 5 % / 1 %).
- Current net download rate (in this example 72,641 Mbit/s).
- Current net average download rate (in this example 60,534 Mbit/s).
- Bytes transferred so far (in this example 95,309 MB).
- Total download file size (in this example 952,153 MB).
- Current and overall transferred data
- Duration of test so far (in h:min:s).
- Remaining transfer time.
- Number of parallel downloads.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

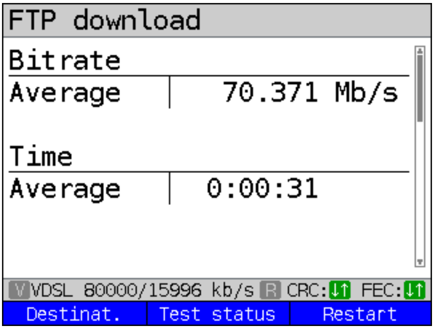
 Cancels test.

Display of test status:
You can observe the running test or start a new test here, see page 232.

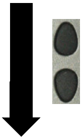
<New> Selects a new single test.

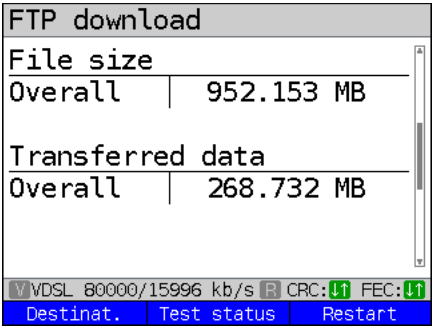
<Stop> Stops FTP download test.

FTP download result



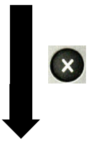
<New>	Selects a new single test.
<Stop>	Stops FTP download test.
	Press shift:
<Stop all>	Stops all active tests.
<Finish all>	Finishes all test.





Display after end of FTP download:

- Calculated average speed of all downloads (in this example 70,371 Mbit/s).
- Average time required for a download in h:min:s.
- Transferred file size (in this example 952,153 MB).
- Overall Transferred data (in this example 268,732 MB).
- Maximum parallel downloads.
- Configured parallel downloads.



Exits results.

Save result?

For saving results, see IP ping page 141.
Sends trace file to PC, see page 113.

14.5 FTP upload

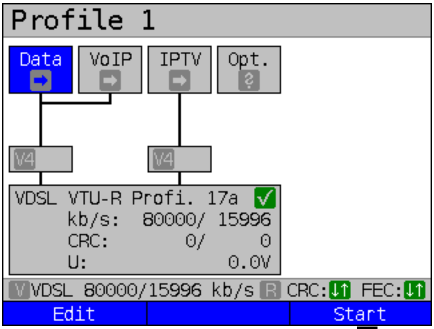
In FTP upload, ARGUS sends the data of a file to a server. Among other information, ARGUS displays the current net upload rate, the usable data of the IP packets, and following conclusion of test the average net speed (for multiple download attempts).

No meaningful evaluations are possible for upload tests with a duration of less than 10 seconds. Therefore, the upload file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 35. See page 147 HTTP download for an explanation of the test parameters.

Starting FTP upload (example: access mode VTU-R, already active)

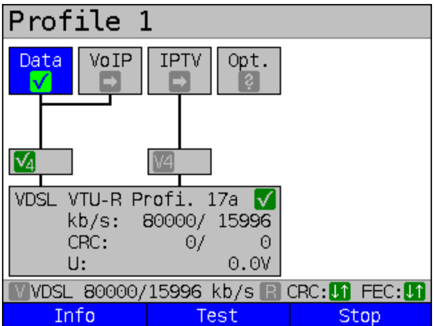


Connecting the service.

The profile shown in the display (in this example profile 1) is used for FTP upload.

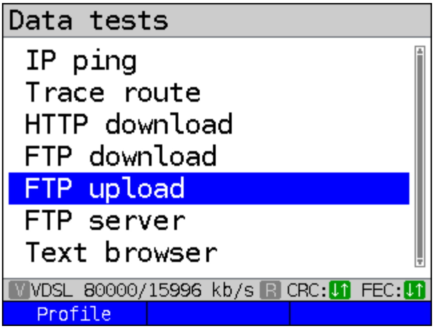
<Edit>	A virtual line is assigned to the service Data.

If no connection is established, ARGUS automatically connects at this point using the default profile (see page 57).



<Info>	Duration of activation.
<Test>	Opens test selection.
<Stop>	Deactivates the service.

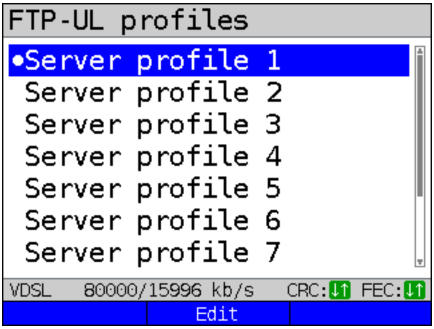
Continued on next page



e.g. FTP upload

<Profile> Displays the available FTP upload profiles.

Mark the server profile (default is indicated with ●).

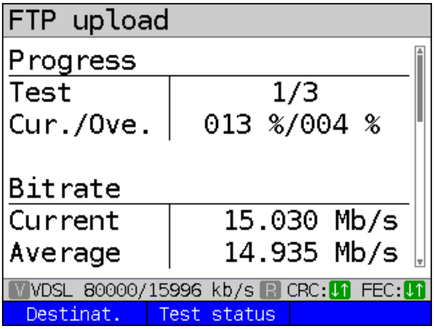


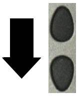
The server profiles are also used for HTTP download and FTP download.

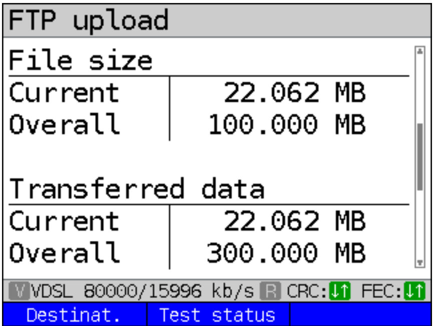
<Edit> Edits the marked profile, see page 147 for changes to the individual parameters.

FTP upload starts automatically.

FTP upload





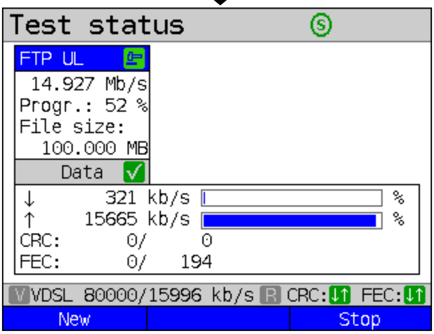


Display during FTP upload:

- Current upload/total number of uploads, in this example the first upload out of three (1/3) is displayed.
- Data already transferred (current / overall) (in this example 13 % / 4 %).
- Current net upload rate (in this example 15,030 Mbit/s).
- Current net average upload rate (in this example 14,935 Mbit/s).
- Bytes transferred so far (in this example 22,062 MB).
- Overall file size (in this example 100,000 MB).
- Current and overall transferred data
- Current upload time in h:min:s.
- Remaining transfer time.

`<Test status>` Displays test status without ending the test or starting a new test, see page 232.

 Cancels test.



Display of test status:
You can observe the running test or start a new test here, see page 232.

`<New>` Selects a new single test.

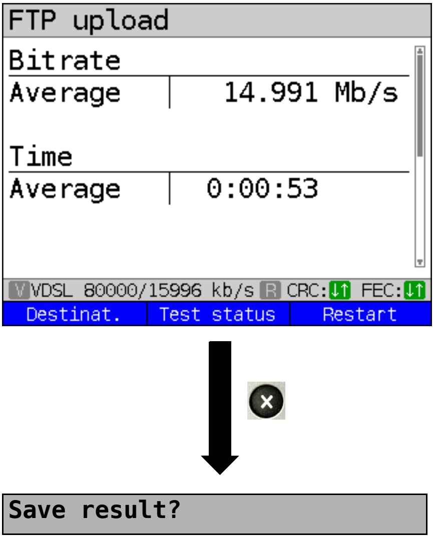
`<Stop>` Stops FTP upload test.

 Press shift:

`<Stop all>` Stops all active tests.

`<Finish all>` Finishes all test.

FTP upload result



Display of results

<Test status>	Display of test status.
<New>	Starts a new FTP upload test.

For information on saving results, see IP ping page 141.
Sends trace file to PC, see page 113.

14.6 FTP server

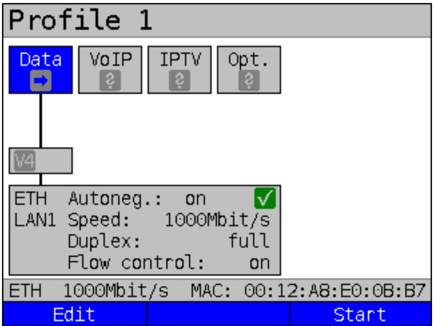
In FTP server mode, ARGUS behaves like a server for FTP requests. In this mode, ARGUS serves FTP download and FTP upload requests.
These requests can be sent from a second terminal device (e.g. another ARGUS unit) via an Ethernet access.
This makes it possible to test end-to-end throughput and determine the maximum possible data rate for this access.

In the following, the throughput test is explained using the Ethernet interface as an example. This example uses two ARGUS units. One serves as the FTP server while another requests the FTP download.

ARGUS 1 - FTP server

No settings need to be configured on the ARGUS used as the FTP server. The FTP server test just needs to be started on the selected interface.

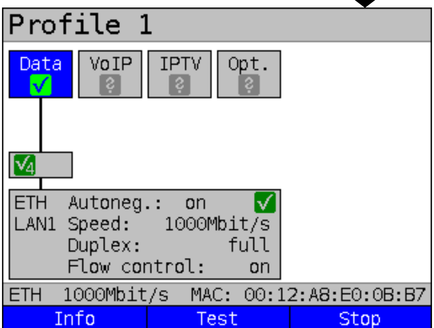
Starting FTP server (example: Ethernet, already active)



Connecting the service.

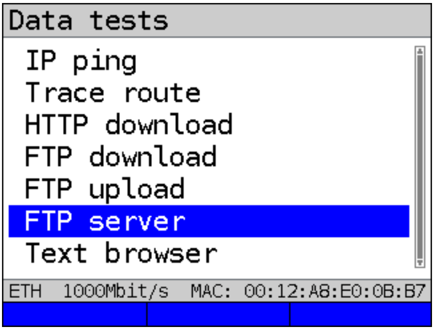
The profile shown in the display (profile 1 in this example) is used for the FTP server.

<Edit> A virtual line is assigned to the service Data.

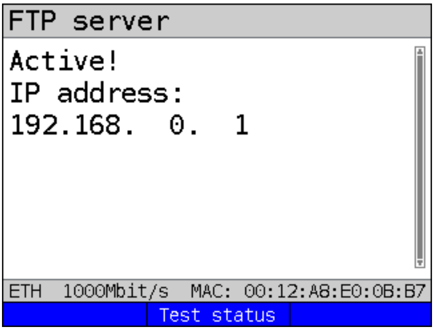


If no connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

Continued on next page



e.g. FTP server



ARGUS uses the IP address configured under "own IP address" as the destination address (server) for the second ARGUS unit.

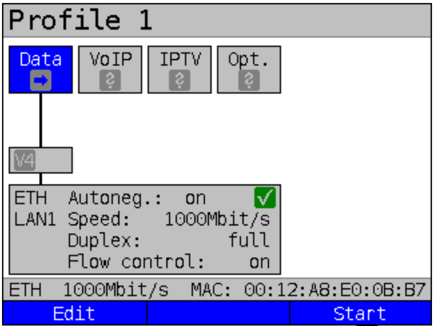
<Test status>	Displays test status without ending the test or starting a new test, see page 232.

ARGUS 1 now waits for an FTP request from a second terminal device (in this example the second) ARGUS).
The IP mode in this example is "static", the default IP netmask configuration is used.

ARGUS 2 - FTP down/upload

In principle, you can adopt the same configuration for the ARGUS unit sending the FTP request (FTP download in this example) as in an FTP download test.
The netmask and IP address (IP mode: static) should match the settings on ARGUS 1.

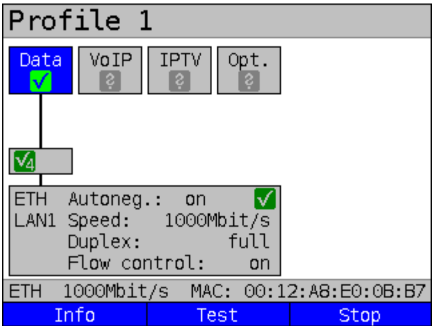
Starting FTP download:



Connecting the service.

The profile shown in the display (profile 1 in this example) is used for the FTP server.

`<Edit>` A virtual line is assigned to the service Data.



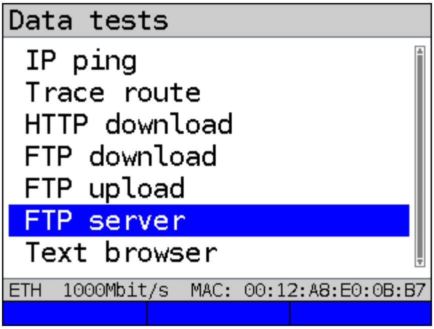
If no connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

`<Info>` Duration of activation.

`<Test>` Opens test selection.

`<Stop>` Deactivates the service.

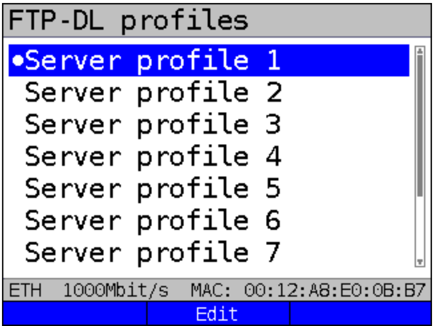
Continued on next page



Test selection

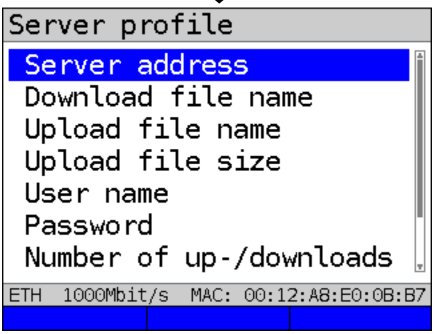
e.g. FTP server

<Profile> Edits FTP parameters, see page 147.



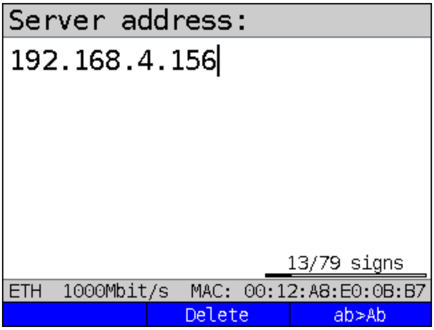
Mark the server profile (default is indicated with ●).

<Edit> Edits the marked profile, see page 147 for changes to the individual parameters.



See page 147 HTTP download for an explanation of the test parameters.

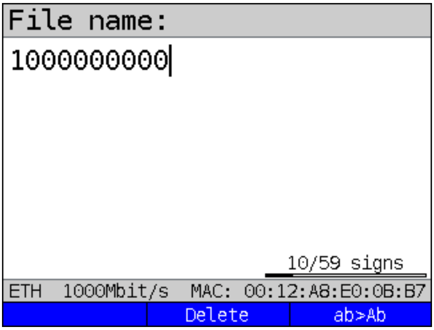
Continued on next page



Enter the address of ARGUS 1 in the server profile of ARGUS 2 as the server IP address, see page 161.

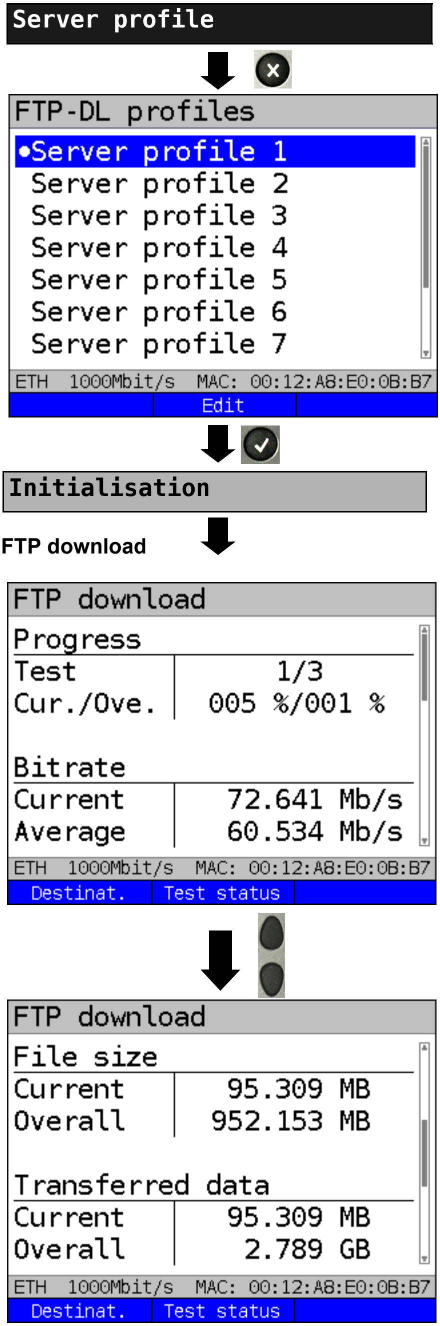
<Delete>	Deletes the place in front of the cursor.
<12>AB>	see page 109.

Download file name



In this case too the download file name is the size of file to be downloaded. The file size is specified in bytes.
Download file name: 1,000,000,000 results in a file size of: 1 GB.

No meaningful evaluations are possible for download tests with a duration of less than 10 seconds. Therefore, the upload file should be as large as possible (depending on the access speed). If the duration of the test is less than 10 seconds, ARGUS does not display any data rate or time.



<Edit> Edits the marked profile, see page 147 for changes to the individual parameters.

FTP download starts automatically.

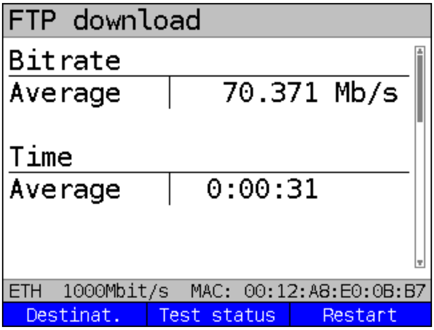
Display during FTP download:

- Current download/total number of downloads, in this example the first download out of three (1/3) is displayed.
- Data already transferred (current / overall) (in this example 5 % / 1 %).
- Current net download rate (in this example 72,641 Mbit/s).
- Current net average download rate (in this example 60,534 Mbit/s).
- Bytes transferred so far (in this example 95,309 MB).
- Total download file size (in this example 952,153 GB).
- Current and overall transferred data
- Current upload time in h:min:s.
- Remaining transfer time.
- Number of parallel downloads.

<Test status> Displays the test status without ending the test.

 Cancels test.

FTP download result



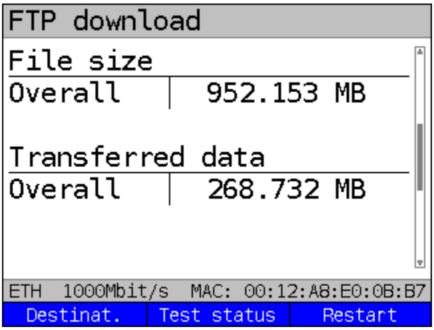
<New> Selects a new single test.

<Stop> Stops FTP download test.

Press shift:

<Stop all> Stops all active tests.

<Finish all> Finishes all test.



Display after end of FTP download:

- Calculated average speed of all downloads (in this example 70,371 Mbit/s).
- Average time required for a download in h:min:s.
- Transferred file size (in this example 952,153 MB).
- Transferred data overall (in this example 268,732 MB).
- Maximum parallel downloads.
- Configured parallel downloads.

Exits results display.

For saving results, see IP ping page 141.
Sends trace file to PC, see page 113.

14.7 Textbrowser

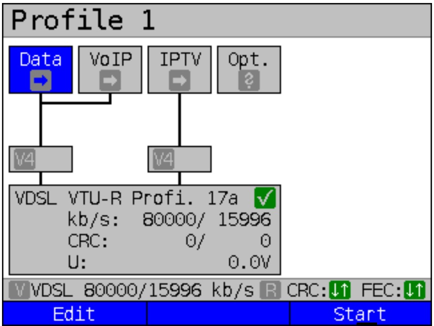
The text browser can display the first 50 lines of text of an HTML web page.

Protocol-independent parameters:

The opening of test parameters is described in the chapter "Configuring accesses", see page 35

Setting	Description
Test parameter:	
Textbrowser:	
Settings	The IP address of a destination node can be entered as either an IP number or a name (URL), see IP ping/IP address, see page 138 for instructions. Default: ***www.argus.info/textbrowser/***

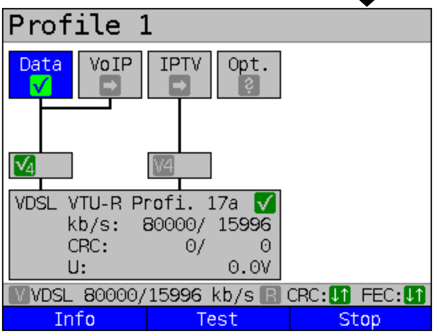
Starting Textbrowser:



Establishing the service

The profile shown in the display (profile 1 in this example) is used for the text browser.

<Edit> A virtual line is allocated to the service Data.



If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (s. page 57).

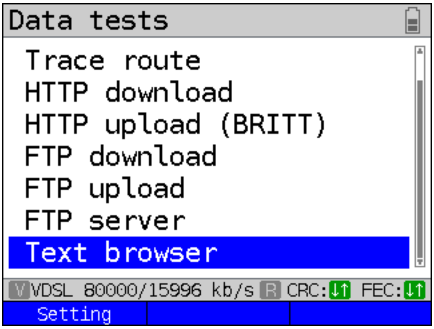
The service Data and the VDSL connection are active..

<Info> Duration of activation.

<Test> Opens test selection.

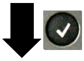
<Stop> Deactivates the service.

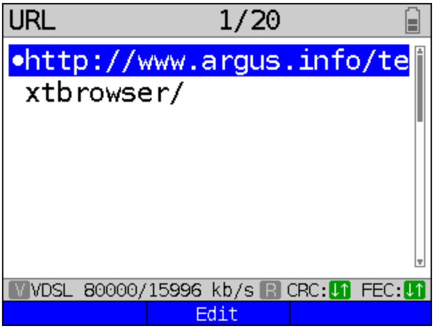
Continued on next page.



e. g. text browser

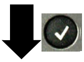
<Setting> Changes text browser parameters, see page 143.

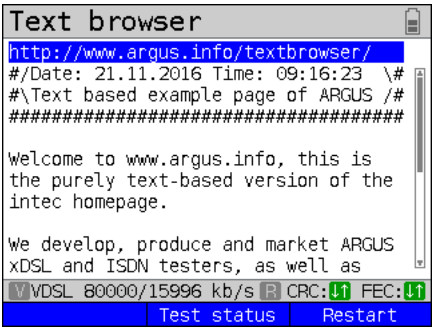




Select URL.
You can configure up to 20 URLs, see „Access name“ on page 28.

If no connection is established, ARGUS automatically connects at this point using the default profile (s. page 57).



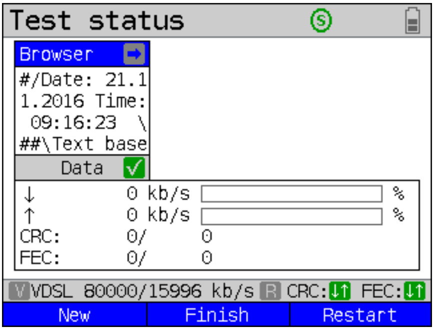


<Destination> Displaying the URL and the IP address.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

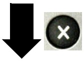
Cancels test
Displays the test results up to this point, with possibility of saving (automatic prompt).

Continued on next page



Display of test status:
You can observe the running test or start a new test here, see page 232.

<New>	Selects a new single test.
<Stop>	Stops text browser.
	Press shift:
<Stop all>	Stops all active tests.
<Finish all>	Finishes all test.



For saving results, see IP ping page 141.
Sends trace file to PC, see page 113.

15 Network scan

In a network scan, ARGUS identifies and displays all hosts, services and servers in a pre-configured subnet. The network scan can only be executed on an Ethernet interface. Scanning via DSL or G.fast is not possible.

⚠ When scanning a network, please observe the applicable legal and data protection requirements.

The network scan requires the following parameters.

Protocol-independent parameters:

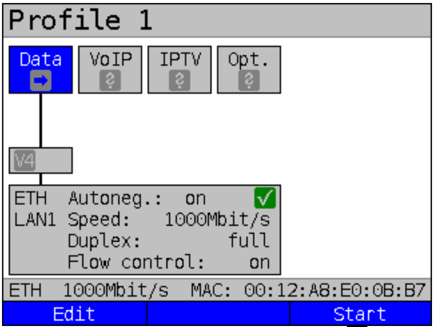
The opening of test parameters is described in the chapter "Configuring accesses", see page 35

Setting	Description
Test parameter:	
Network scan:	
Mode	In "Manual" mode, the network scan uses the stored network address and netmask. In "Automatic" mode, the instrument reads the parameters from the connected DHCP server. Default: ***Manual***
Network address	The network address specifies the subnet to be searched for hosts and services. Range: 0.0.0.0 to 255.255.255.255 Default: ***192.168.1.0***
Netmask	The netmask is a part of the network address and describes the size of the subnet. Range: 0.0.0.0 to 255.255.255.255 Default: ***255.255.255.0***

⚠ ARGUS only scans a limited number of hosts, services and servers. The subnet to be scanned should thus always be sized as small as possible; otherwise ARGUS will not show any results.

⚠ ARGUS still communicates with the DHCP computer even when Manual is selected. When the server returns an IP address that is not in the same subnet as the manually configured one, the test fails.

Starting network scan (example: access mode Ethernet, already active)

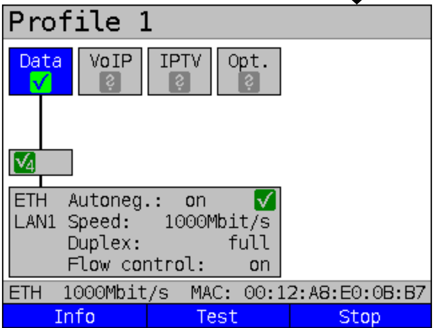


Connecting the service

The profile shown in the display (profile 1 in this example) is used for network scan.

<Edit> A virtual line is added to the service Data.

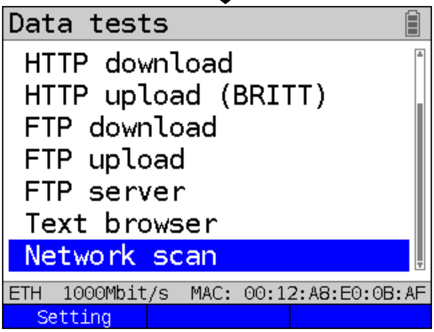
If no connection is established, ARGUS automatically connects at this point using the default profile



<Infos> Duration of activation.

<Test> Opens test selection.

<Stopp> Deactivates the service.



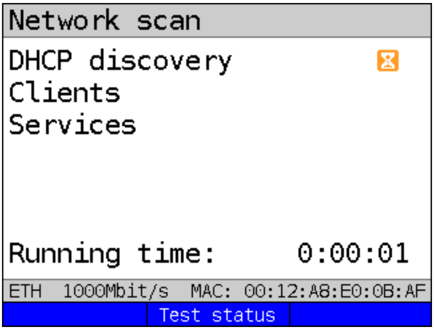
e. g. Network scan

<Setting> Changes network scan parameters, see page 171.

The network scan starts automatically.

Continued on next page

Network scan



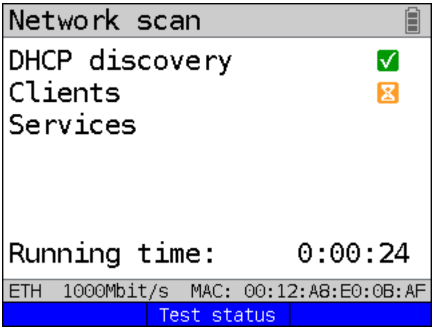
Display during the network scan:

- Display the status of:
  - DHCP discovery
  - Clients
  - Services
- Running time in h:min:s

In this example, a request to the DHCP server is running.

Information that is unavailable is grayed out.

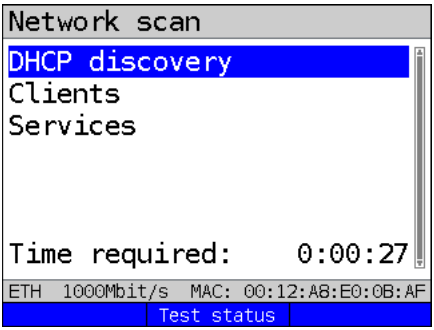
The duration of the scan depends on the size of the network (netmask) and the number of hosts found.



In this example, DHCP discovery was terminated, and the instrument scans for all available clients.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

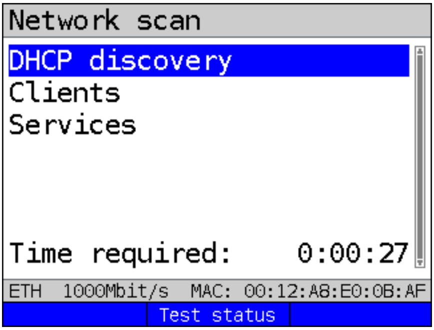
A maximum of 50 entries per test are saved.



The network scan was completed. You can now view the results using the corresponding menu options.

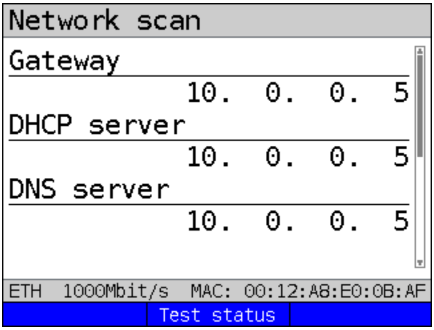
Continued on next page

Network scan result



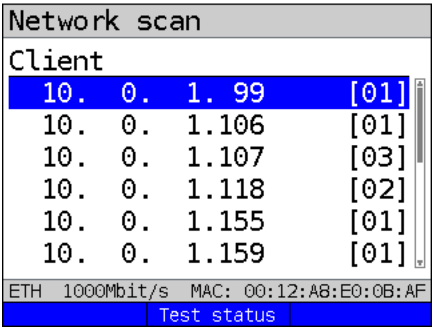
Selection of
- DHCP discovery
- Clients or
- Services

by using the cursor keys.



DHCP discovery:
- Current Gateway
- Current DHCP server
- Current DNS server
- Current netmask
- Number of detected clients

To access the clients, close the results of DHCP Discovery with and select "Clients".

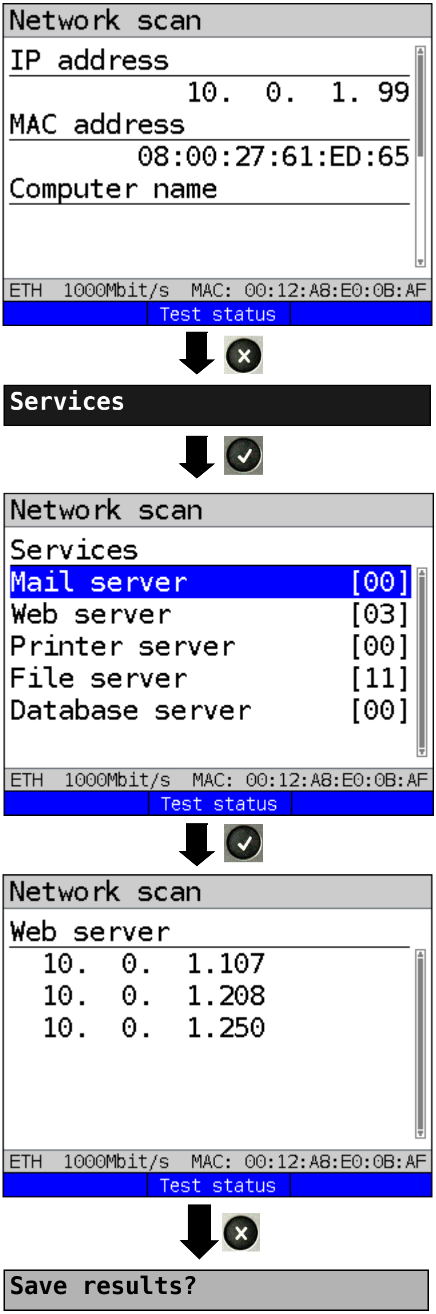


Identified clients
In this example, all clients in the same subnet are displayed. The number of ports for each client (IP) is also shown in square brackets.

<Tes status> Displays test status without ending the test or starting a new test, see page 232.

Select a client.

Continued on next page



Tests results of the selected client:

- IP address
- MAC address
- Computer name
- NetBIOS name
- Open ports

To access the services, close the results of clients with and select "services".

Identified services:
Display of services present in the scanned network. The number of servers for each service found is also shown in square brackets.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

Select of server type.

In this example: list of web servers in this network.

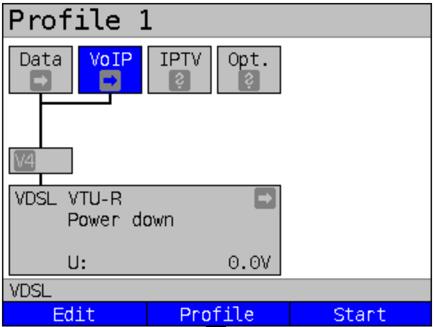
Exits results

For saving results, see IP ping page 141.

16 VoIP tests

ARGUS operates as a VoIP terminal device with active acoustics, enabling voice links. Session Initiation Protocol (SIP) is available as a VoIP signalling protocol. Calls can be established both with and without registrar/proxy. ARGUS can be used to establish VoIP connections (DSL telephony) via xDSL, G.fast and Ethernet. To assess voice quality, ARGUS determines and displays the MOS/R-factor and the RTP datastream.
You can configure three VoIP "accounts" (profiles):

Protocol-independent parameters:

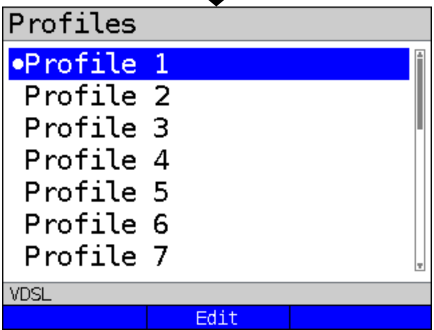


ARGUS in status screen.

<Edit> A virtual line is assigned to the service VoIP.

<Profile> See page 35 for profile settings.

<Start> Starts the service.



Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet or xDSL connection and conducting the VoIP test.

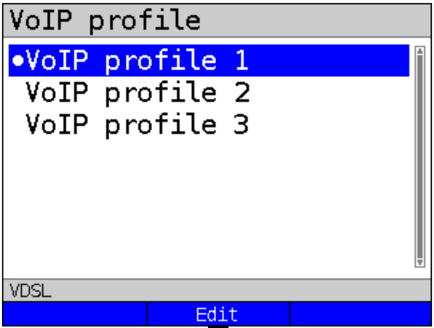
ARGUS uses the marked profile as the default profile and switches to the menu Settings.

Services

Service VoIP

Continued on next page

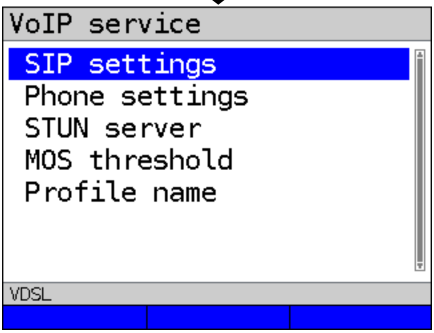
VoIP account



A total of three user-defined VoIP profiles are available.

<Edit> Edits the VoIP profile.

Edits the marked profile.



Edit the marked parameters.

Setting	Description	
VoIP account settings:		
VoIP:	You can create a total of three VoIP profiles. <Edit> Activates the profile you wish to edit.	
SIP	User name	User name for registrar, see page 109 for instructions.
	Password	Password for the registrar, see page 109 for instructions.
	Authentication	Additional xTU-R password for legitimate authentication. See page 109 for instructions
	Caller ID	Optional entry of a user-definable text which then appears in the display of the called party in place of the caller's originating number. See page 109 for information on using the softkeys.
	Registrar Server	Use registrar: select yes or no If an internet telephony service provider (ITSP) is used (in this case you dial a normal telephone number), a registrar must be used as well. If a VoIP telephone is dialled directly, e.g. via the IP address or SIP URL, no registrar is needed. You can edit and use an IPv4 or IPv6 address as well as a name for the registrar server. The address is edited in the same way as for the IP ping test, see page 137. Default: ***no***
	Outbound proxy/ SBC	Use proxy (SBC = session border controller) Determines whether an outbound proxy is to be used. Default: ***no*** Outbound proxy/SBC: address of proxy server. The outbound proxy/SBC is configured in the same way as for the IP ping test, see page 137. Outbound proxy/SBC port: port of proxy server. Range: 0 to 65535 Default: ***5060***
	DNS resolution	You can define the type of DNS resolution here. Choose SRV Record or A/AAA Record. Default: ***SRV Record***

SIP trunking	Use trunking	SIP trunk makes it possible to manage multiple different numbers, each with its own extensions, using a single access account. Default: ***no***
	CLIR	The setting CLIR (calling line identification restriction) can be used to suppress the originating caller ID. Default: ***no***
	Own basic number	The trunk number is a telephone number with no extension. Default: ***4923519070***
	Own extension (DDI)	DDI enables the desired access to be dialled directly. You can edit the extension using <Edit> (up to 4 characters). Default: ***0***
Transport protocol	Determines which transport protocol is to be used. Choose between UDP and TCP. For the setting "TCP fallback", ARGUS attempts to use the TCP protocol instead of the UDP protocol for a data stream with large packets. The TLS protocol (formerly SSL) is a hybrid encryption protocol for secure data transmission. Default: ***TCP fallback***	
SIP domain	Configuration of the domain name for the "from" field in the SIP message (when using an ITSP).	
Listen port	Port used for incoming SIP signalling. Range: 0 to 65535 Default: ***5060***	
Remote port	Port used at the remote station: When a registrar is used (see "registrar server" setting on page 178), entry of the port number of the registrar/ proxy server, otherwise entry of the port number at the remote station. Range: 0 to 65535 Default: ***5060***	
User agent	ID string/terminal device type is transmitted to the called party. Default: ***Argus156***	

	Reg. expire	Determines the period of validity of registration with the registrar. Range: 10 - 6000 seconds Default: ***3600 seconds***
	Qualify	Determines whether the availability of the proxy service is to be continuously verified. Default: ***no***
	Retry-after	Following a failed registration, the standard calls for a 100 second delay before attempting to register again (standard). When "ignore" is set, registration is repeated in increasing intervals (1 second several times, then 2 s, 4s, etc.). Default: ***standard***
	Delete exist. registrar	The current registration is cancelled at the registrar. If this is set to "yes", exclusive registration of ARGUS at the registrar server. Otherwise inclusion in the list of existing registration. Default: ***yes***
`Phone settings`	RTP port range	SIP signalling and RTP data are transmitted via different ports. The port range used can be adjusted for RTP, e.g. to match a router. Range: 0 to 65535 Default: Start: ***10000*** End: ***20000***
	Silence detection	When this setting is "on", ARGUS does not transmit voice packets during pauses in speech. However, this can cause problems in port assignment behind a NAT router. When the setting "not used" is selected, the feature "silence detection" is not communicated to the remote station. However, it remains set. Default: ***off***

Jitter buffer	Determines whether the size of the jitter buffer is static or adaptive. Default: ***static***	
	static:	Entry of a static jitter buffer size. Range: 20 to 200 ms nominal: ***60 ms***
	adaptive:	Entry of the minimum (min) and maximum (max) jitter buffer size and the initial value (init). Range: 20 to 600 ms Default: min: ***60 ms*** init: ***60 ms*** max: ***120 ms***
Codecs	Prepares a list of the speech codecs to be used. For multiple codecs, the order determines the priority.	
		Switches to softkey assignment.
	`<↓>`	The selected codec is moved down one place in the list.
	`<↑>`	The selected codec is moved up one place in the list.
	`<Insert>`	A display with the available voice codecs opens. A voice codec marked with  in this selection menu is inserted in the voice codec list (via the voice codec marked in the list).
	`<Delete>`	Deletes the marked codec from the list.
		Adopts the codec priorities.
	Supported Codecs	G.729 A/B, G.726-40, G.726-32, G.726-24, G.726-16, G.722, G.711 A law, G.711 μ law, G.723.1

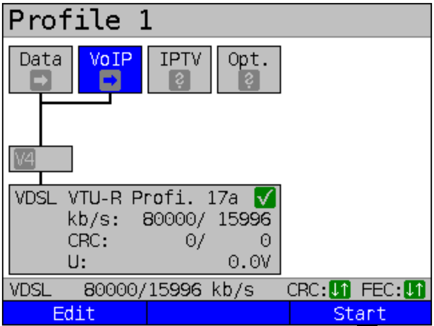
<table>
<tr>
<td>Phone settings
(continued)</td>
<td>DTMF settings</td>
<td>Dual-tone multi-frequency (DTMF) is a multifrequency dialling method.
Mode: Sets DTMF mode
You can choose between "Automatic", "SIP info", "RFC 2833" and "Inband".
Default: Automatic
Duration: Sets the VoIP DTMF timer
Range: 40 to 1000 ms.
Up to 200 ms in steps of 10, up to 300 ms in steps of 20, up to 1000 ms in steps of 100.
Default: 80 ms
 Increases or decreases the VoIP DTMF duration.</td>
</tr>
<tr>
<td>STUN server</td>
<td>Use STUN</td>
<td>Use STUN: select yes or no
If a NAT router is located between ARGUS and the nearest remote station (gateway), STUN must be used so that ARGUS can determine under which IP address the remote station sees ARGUS. Default: no</td>
</tr>
<tr>
<td></td>
<td>STUN server</td>
<td>STUN server: address of a STUN server, which must be in the same network (on the same level) as the remote station.</td>
</tr>
<tr>
<td>Rated/ threshold value</td>
<td>MOS rates value</td>
<td>Entry of MOS setting:
The mean opinion score (MOS) assesses the quality of voice data. The MOS quality scale ranges from 5 (excellent) to 1 (bad). On the basis of the set MOS value, ARGUS rates the current VoIP voice link as "OK" (current MOS value achieves MOS setting) or "FAIL".
Range: 1.0 to 5.0
Default: 4.0
<table>
<tr><td>value</td><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr>
<tr><td>Voice quality</td><td>excellent</td><td>good</td><td>fair</td><td>poor</td><td>bad</td></tr>
</table>
The MOS value here is stated as MOS_{CQE} (conversational quality estimated). The use of a specific codec has a significant influence on this.</td>
</tr>
<tr>
<td></td>
<td>Jitter threshold</td>
<td>Determines the threshold for the jitter.
Range: 0 to 200 ms
Default: * (off)</td>
</tr>
</table>

	RTP loss threshold	Determines the threshold for the RTP loss threshold. Range: 0 to 100 % Default: * ***(off)***
`Profile name`	Enter/modify name of edited VoIP profile.	

`VoIP QoS (Quality of Service)`		
`Layer 3 DiffServ`	Differentiated services: Classification/prioritisation of IP packets (L3)	
`RTP (ToS/DSCP)`	ToS	Type of service Field for setting the priority in the IP header of the usable data (RTP), see page 138 for further details. Range: 0 to 0xFF Default: ***18***
	DSCP	Differentiated services codepoint Field for setting the priority in the DS field (6 bits) of the usable data (RTP), see page 138 for further details. Range: 0 to 0x3F Default: ***00***
`SIP (ToS/DSCP)`	ToS	Type of service Field for setting the priority in the IP header of SIP data (signalling), see page 138 for further details. Range: 0 to 0xFF Default: ***18***
	DCSP	Differentiated services codepoint Field for setting the priority in the DS field (6 bits) of the SIP data (signalling), see page 138 for further details. Range: 0 to 0x3F Default: ***00***
`Layer 2 VLAN Prio`	The VLAN prioritisation on layer 2 is an extension of the Ethernet header.	
`RTP VLAN Prio`	VLAN prioritisation of usable data (RTP) Range: 0 to 7 Default: ***0***	
`SIP VLAN Prio`	VLAN prioritisation of SIP data (signalling) Range: 0 to 7 Default: ***0***	

16.1 Starting VoIP telephony

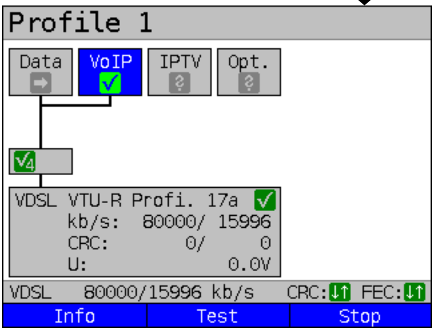
(Example: VDSL access, already active)



Connecting the service.

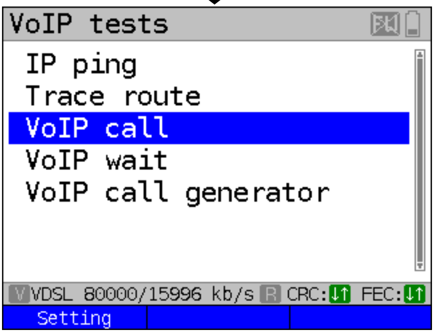
The profile selected for xDSL connection (in this example profile 1) is also used for VoIP telephony.

<Edit>	Edits the default virtual line profile.



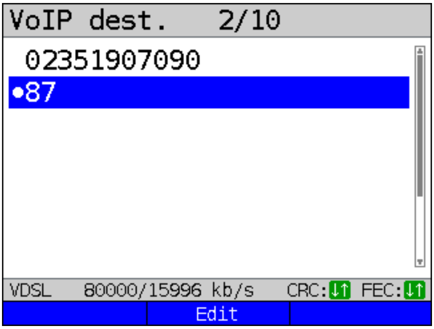
If no xDSL or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

<Info>	Duration of activation, page 189.
<Test>	Opens test selection.
<Stop>	Deactivates the service.



e.g. select VoIP call

Continued on next page



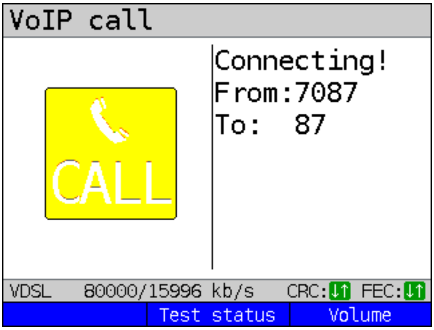
Mark the VoIP destination (default is indicated with ●).

Scroll down with the cursor, mark a blank line and add a new VoIP destination using **<Edit>**.

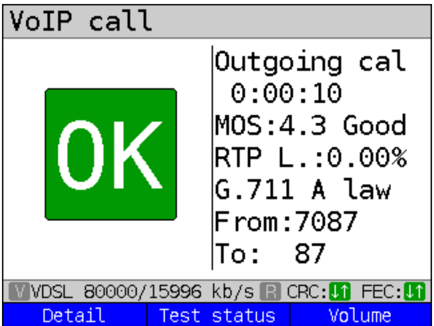
<Edit> Edits the VoIP destination number.

Initialisation

Connecting



ARGUS displays "own number" (from: 7087) and the number of the called subscriber (to: 87). The called subscriber has not yet accepted the call: display shows "Connecting!" and yellow CALL symbol.



Continued on next page

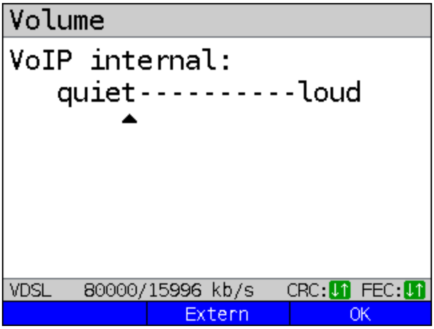
Continued on next page, second screenshot

The called subscriber has taken the call ("Connected!"): ARGUS determines the MOS value and displays whether the set MOS voice quality value (see page 182) is reached ("OK" or "FAIL"). ARGUS also displays the classification of the MOS value according to ITU-T P.800 (in this example "good"), the duration of the connection and the currently used voice codec (in this example G.711 A law, see page 181) are also displayed.

<Detail> Displays the VoIP parameters.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

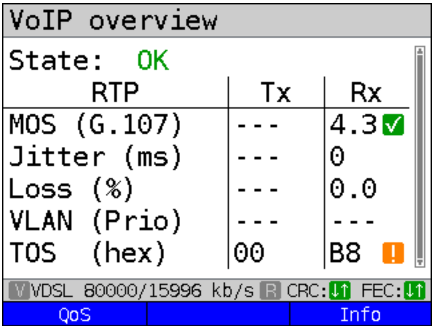
<Volume> Opens volume control.



Volume control settings:

<External>	Headset mode
<Internal>	Earpiece mode
<OK>	Adopts settings

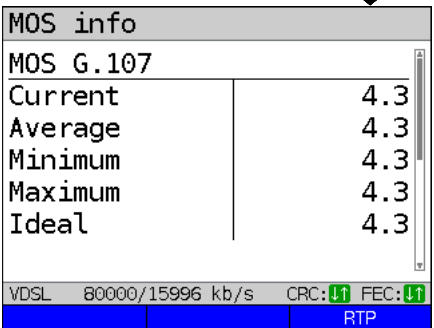
<Detail>



VoIP overview display (for transmitted and received packets including assessment)

- Status of MOS value (FAR-MOS/MOS)
- Jitter in ms
- RTP loss rate
- VLAN (prio) in hexadecimal
- TOS (hex) in hexadecimal

The FAR-MOS value is only displayed when the remote station supports RTCP.

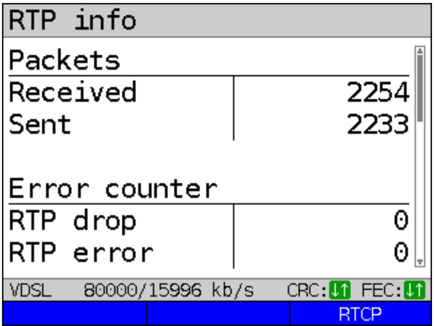


Displays MOS information:

- Current MOS
- Average MOS
- Min./max. MOS value
- Ideal MOS (possible MOS without interference, codec-dependent)
- Current and average R-factor according to ITU-T G.107

Back to previous display.

Continued on next page

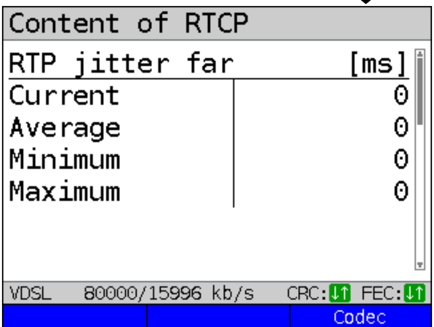


Display of further VoIP results:

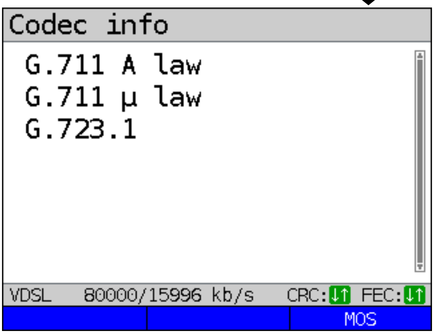
Packet statistics:

- Received packets (Rx)
- Transmitted packets (Tx)
- Error counter:
  RTP drop
  RTP error
- RTP jitter Rx:
  Current jitter
  Average jitter
  Minimum jitter
  Maximum jitter
- Lost RTP packets (Rx)
  Total, current, average, min. and max.

Back to display "Outgoing call"



RTCP content
Displays the statistics returned by the remote station.
- Current jitter of remote station Rx (far)
- Average jitter at remote station
- Maximum and minimum jitter of remote station
- Lost RTP packets at remote station Rx (far): total, current, average, min. and max.
- Delay calculated from transmission time of RTCP packets (network delay): current, average, min., max.



If the message "no data" appears, that means that the remote station does not support RTCP.

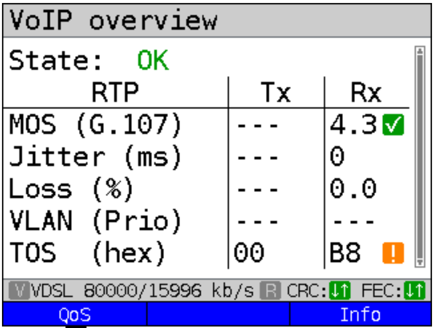
ARGUS displays the available codecs of the remote station.

Continue to display "Outgoing call"

<MOS> Back to display "MOS info", ring navigation

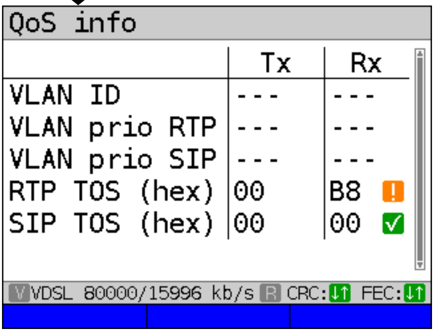
Return to status screen without ending the test.

Continued on next page



VoIP overview display (for transmitted and received packets including assessment)

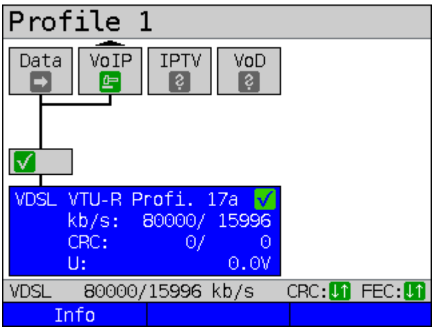
- Status of MOS value (FAR-MOS/MOS)
- Jitter in ms
- RTP loss rate
- VLAN (prio) in hexadecimal
- TOS (hex) in hexadecimal



VoIP overview display (for transmitted and received packets including assessment)

- VLAN ID
- VLAN prio RIP
- VLAN prio SIP
- RTP TOS in hexadecimal
- RTP TOS in hexadecimal

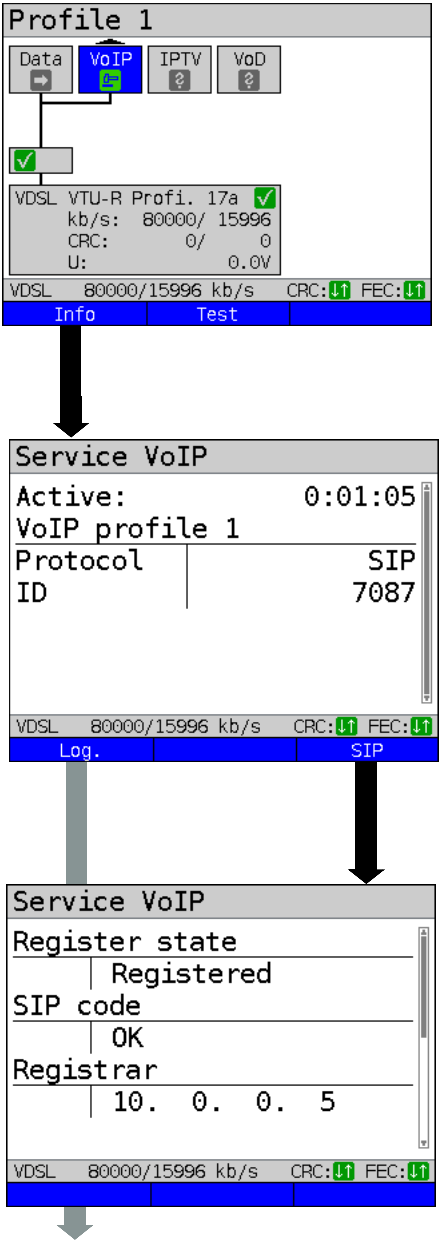
Back to the status screen without stopping the test.



ARGUS in status screen.
Another test is still running using the service VoIP (indicated by the green hammer symbol).

Using the cursor keys, select the service VoIP.

Continued on next page



Continued on next page

<Test> Displays the overview of results.

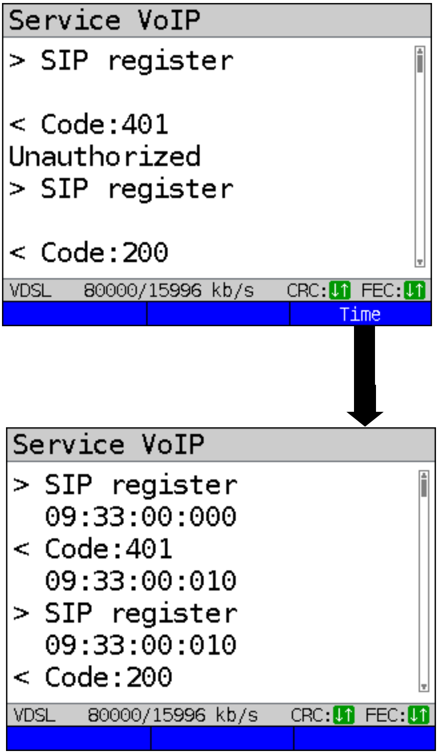
<Info> or  Displays the VoIP calling parameters.

ARGUS displays the duration of the active VoIP service, the protocol used and the user name.

<SIP> Display of registration details: status codes, registrar IP, registrar used, outbound proxy/ SBC and URI used and more.

<Log.> Displays the VoIP service SIP commands, see page 190.

Before, during and after the connection, ARGUS displays the registration details. The setting "Use register" must be set to "yes".



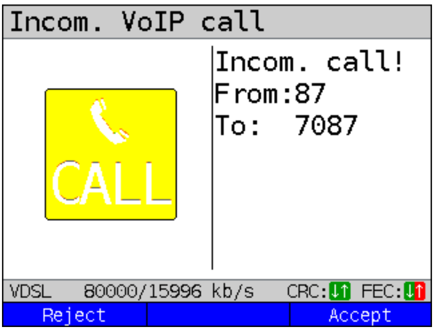
ARGUS displays the SIP commands in the service VoIP.

For more information ((s. chapter G) VoIP SIP status codes page 323).

<Time> Puts a timestamp on all events.

The timestamp uses the ARGUS-internal system time, see page 301.

Incoming call:



ARGUS can be called while the service VoIP is active. An incoming call is indicated by the yellow CALL symbol. The call can be accepted or refused.
For automatic call acceptance, you need to start the specific test "VoIP wait", see page 194.

<Reject> Refuses the call.
Switches to status screen.

<Accept> Accepts the call.
Switches to ARGUS status.

Overview of VoIP results

During/after registration:

	Display /description
SIP log	Log showing the exchanged SIP methods and status codes.
Register status	In the "Register status" result screen, ARGUS displays all important registration and registrar information.

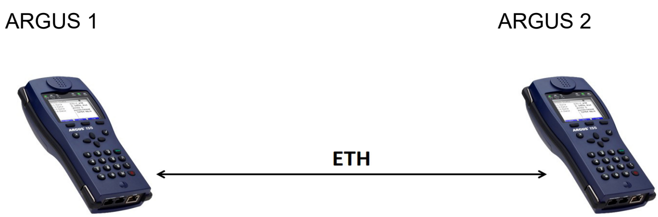
During call/connection:

	Display/ Description
MOS value, voice codec	Current **MOS value**, currently used **voice** codec.
SIP log:	Log showing the exchanged SIP methods and status codes.
INFO: MOS results:	**Threshold:** indicates whether the preconfigured MOS threshold is complied with. **P.800:** Evaluation according to ITU-T P.800 **MOS value:** current/average/min./max. **R-factor:** current/average/min./max.
INFO: RTP results	**RTP packets:** received/sent **RTP drop:** received packets rejected by the jitter buffer. **RTP error:** received but defective RTP packets. **RTP jitter Rx:**current/average/min./max. *(Calculated according to RFC 3550 per sec.)* **RTP packet loss Rx:**current/average/minimum/ maximum in percent **RTP packet loss total:** *(RTP packets not received)*
INFO: RTCP results: *(The contents of the RTCP packets are displayed, provided this is supported by the remote side!)*	**IP jitter remote side:** current/average/minimum/maximum **RTP packet loss remote side:** current/average/ minimum/maximum in percent **RTP packet loss remote side Total** **Network delay:**current/average/maximum/minimum *(calculated on the basis or RTCP packets)*

16.1.1 VoIP back-to-back

ARGUS permits a VoIP call to a second terminal device, e.g. another ARGUS unit. To enable calling, both ARGUS instruments must be configured as follows:

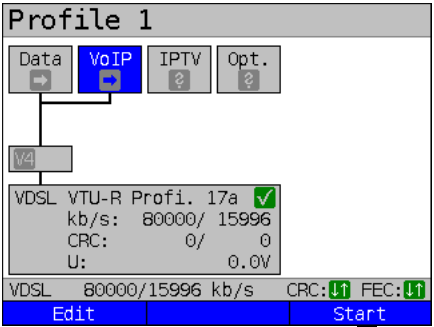
	ARGUS 1	ARGUS 2
Access, s. page 25	Ethernet IP based	
Protocol, s. page 107	IP	
IP version, s. page 110	IPv4	
IP mode, s. page 110	Static	
Own IP address, s. page 110	In example 10.0.0.1	In example 10.0.0.2



Now enter the IP address of ARGUS 2 in ARGUS 1 as the target telephone number to initiate a VoIP call. The IP address of ARGUS 1 must be entered as the target telephone number in ARGUS 2. The call is connected just as for VoIP-call/VoIP-wait, see page 184.

16.2 VoIP wait

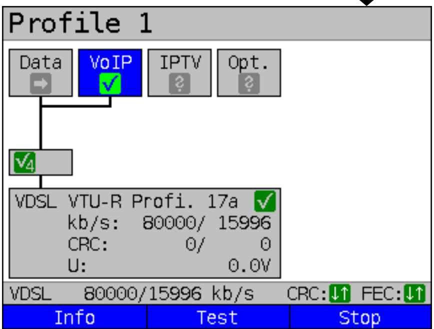
In the test "VoIP wait", ARGUS behaves like a VoIP telephone.
The VoIP call (see page 178) and the VoIP wait parameters must be configured for the VoIP wait test.



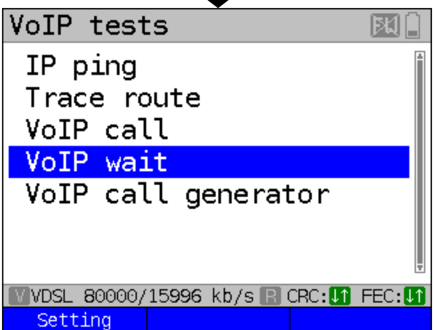
Connecting the service.

The profile selected for connecting the service (in this example profile 1) is also used for VoIP wait.

<Edit> Edits the default virtual line profile.

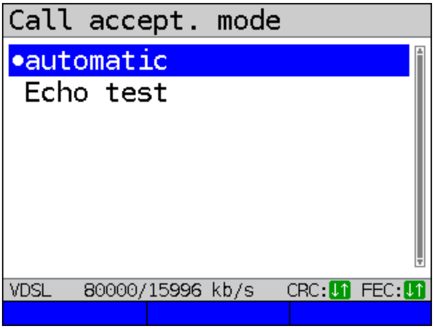


If no xDSL, G.fast or Ethernet connection is established, ARGUS automatically connects at this point using the default profile (see page 57).



<Setting> Opens call acceptance mode for VoIP wait.

Continued on next page



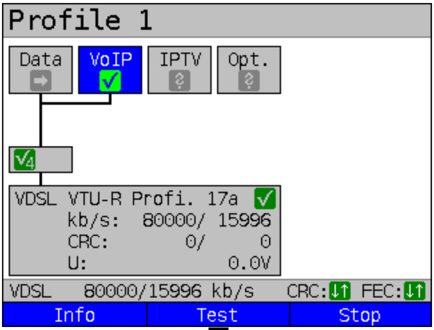
The test VoIP wait offers the following configuration options:

- Automatic
- Echo test

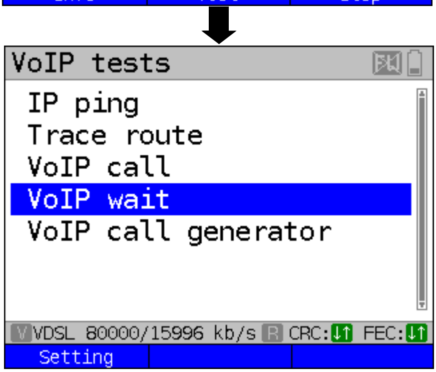
Default: ***Automatic***

⚠ ARGUS uses the user name entered under SIP parameters (see page 178) as its own number.

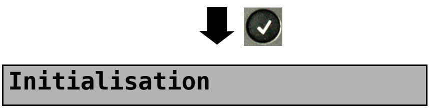
Start VoIP wait



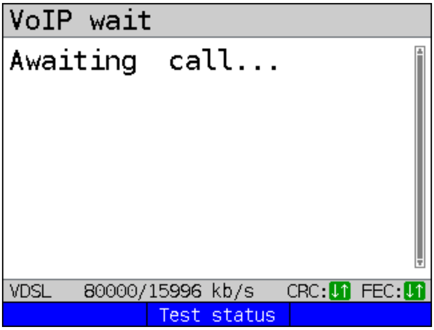
The service VoIP and the VDSL access are active.



Select VoIP wait.

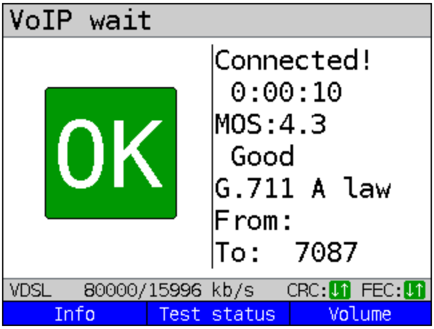


Continued on next page



ARGUS waits for a VoIP call.

<Test status>	Switches to test status, see page 185.



ARGUS accepts the call automatically (see setting page 194).

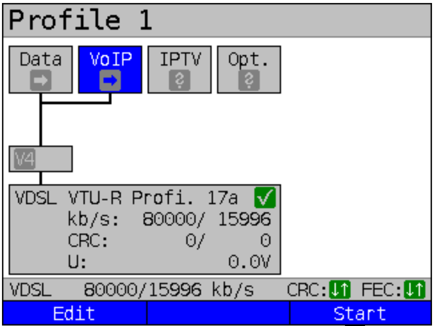
The connection parameters are the same as for VoIP call and are explained on page 185 and following.

Connecting:

⚠ The connection is established as for IP ping. However, pressing "Cancel" initially only disconnects (if a connection existed). ARGUS remains registered with the registrar (service VoIP active) and remains available for the caller (an incoming call can be refused or accepted). Deactivate the service VoIP to terminate registration. However, the established access remains active.

16.3 VoIP call generator

(Example: VDSL access, already active)

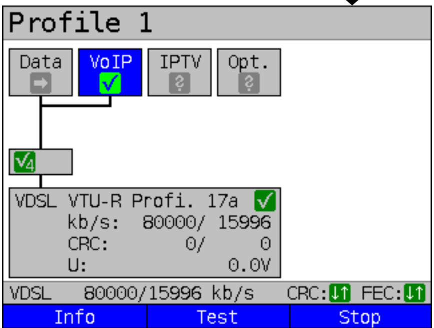


Connecting the service.

The profile selected for connecting the service (in this example profile 1) is also used for the VoIP call generator..

<Edit> Edits the default virtual line profile.

⚠ The service VoIP is greyed out when the VoIP option is not set..

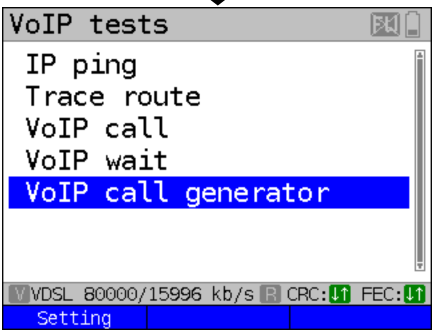


If no xDSL, G.fast oder Ethernet connection is established, ARGUS automatically connects at this point using the default profile (s. page 57).

<Info> Duration of activation, page 189.

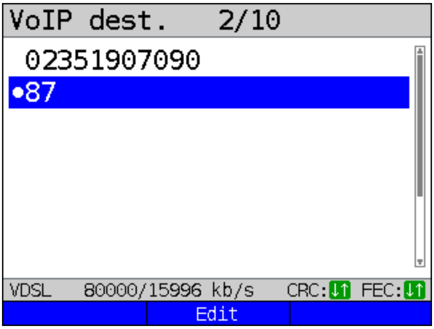
<Test> Opens test selection.

<Stop> Deactivates the service.



Select VoIP call generator.

Continued on next page.

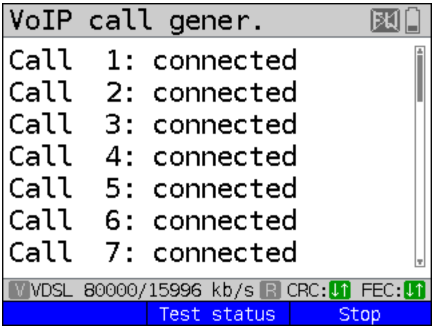


Mark the VoIP destination (default is indicated with ●).

Scroll down with the cursor, mark a blank line and add a new VoIP destination using **<Edit>**.

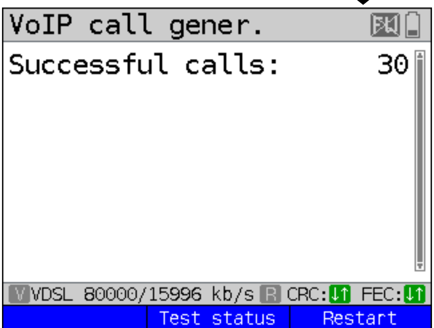
<Edit> Edits the VoIP destination number.

Connecting



Up to 30 consecutive VoIP calls to a configured VoIP destination are established. The connection is maintained until the test is stopped.
As soon as a call is refused, ARGUS stops establishing further calls. Existing calls remain connected. If the remote station hangs up a call, this is indicated for that call. The test remains active until you press the “Stop” softkey – even if the remote station has terminated all calls.

<Stop> Deactivates the call generator.

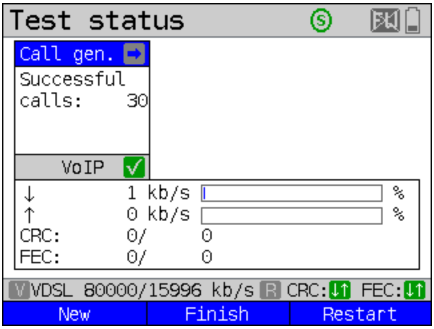


The number of successful calls is displayed. These are the calls that were still connected when the test was stopped. Calls that were refused or terminated by the remote station are not displayed.

<Test status> Displays the test status without ending the test, s. page 232.

<Restart> VoIP call generator is restarted.

Continued on next page.



Displays the number of successful calls.

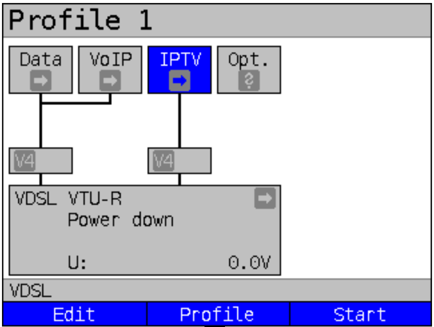
<New>	Selects a new single test.
<Finish>	Saves the result.
<Restart>	VoIP call generator is restarted.

17 IPTV tests

17.1 IPTV

ARGUS requests a datastream from a server (depending on the access type, ARGUS replaces the set-top box (STB) or modem plus STB) and checks the regularity of the incoming packets, packet loss and the switch-on/switch-over time of the program. You can configure three user-defined IPTV profiles (where the xDSL, G.fast or Ethernet connection is already established, the connection parameters, e.g. the target value, are locked):

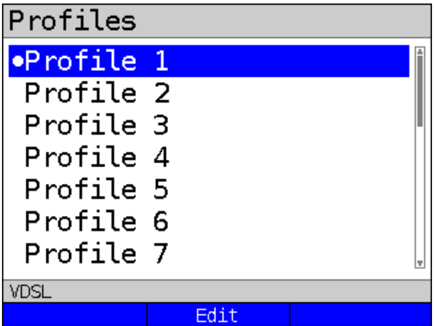
Protocol-independent parameters



ARGUS in status screen.

The IPTV-STB emulation is realised using the service IPTV.
The following example illustrates the procedure and its special features.

`<Edit>`	Assign virtual lines to the service IPTV.
`<Profile>`	See page 35 for profile settings.
`<Start>`	Starts the service.



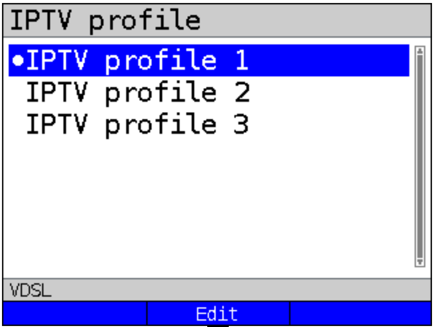
Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the preset profiles for establishing the Ethernet, G.fast or xDSL connection and conducting the IPTV test.

ARGUS uses the marked profile as the preset profile and switches to the menu Settings.

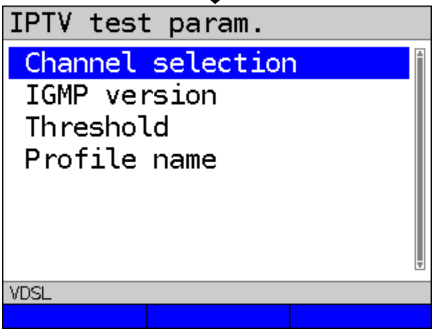
Test parameters

IPTV / IPTV passive

Continued on next page



A total of three user-defined IPTV profiles are available.



Edits the marked IPTV profile.

Edits and modifies the marked parameters

Setting	Description
Test parameters:	
IPTV:	You can create a total of three IPTV profiles. <Edit> Activates the profile you wish to edit.
Channel selection	The channel list can be used and edited in all profiles. You can store up to 250 channels. Using the software WINplus/WINanalyse you can also create a configuration conveniently using the PC and load it to ARGUS. Selecting the TV channels for the IPTV test. <Edit> Edits channel

`Multicast address`	Specifies the multicast IP and source IP (SSM). Multicast IP range: 0.0.0.0. to 224.0.0.0/ Default: ***224.0.0.0*** Source IP range: 0.0.0.0 to 0.0.0.255 Default: ***0.0.0.0***
`Port`	Specification of port. Range: 0 to 65535 Default: ***0***
`TV station`	Enters a TV station name for the IPTV channel.
`IGMP version`	Version of the management protocol for joining/quitting a multicast group. Range: 2 to 3 Default: ***3***
`Thresholds`	Establishes the limit values for the IPTV test. When these values are exceeded during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Specifying "*" deactivates the respective limit value check.
`IGMP latency`	Sets the limit values for the latency (switch-on delay of the program). Range: 0 to 25,000 ms Default: ***500 ms***
`Sync error`	Establishes the limit values for the sync error. Range: 0 to 10,000 Default: ***0***
`PCR jitter`	Establishes the limit values for PCR jitter. 0 to 2000 ms Default: ***100 ms***
`Error indication`	Establishes the limit values for error indication. Range: 0 to 10,000 Default: ***0***
`CC error`	Establishes the limit values for CC errors. Range: 0 to 10,000 Default: ***0***
`CC error rate`	Establishes the limit values for the CC error rate. Range: 0.00 % to 100.00 % Default: ***0.00 %***

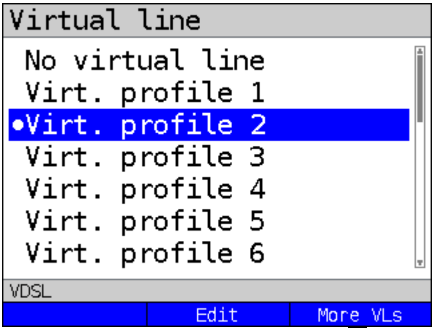
`Audio bytes`	Sets the target value for audio bytes. When the measurement falls below this threshold during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Range: 0 to 6,553,600 Default: ***0***
`Video bytes`	Sets the target value for video bytes. When the measurement falls below this threshold during the IPTV test, the display shows the test result "FAIL", otherwise "OK". Range: 0 to 6,553,600 Default: ***0***
`RTP jitter`	Establishes the limit values for RTP jitter. Range: 0 to 2000 ms Default: ***100 ms***
`RTP sequence errors`	Establishes the limit values for sequence errors. Range: 0 to 10,000 Default: ***0***
`Current RTP loss rate`	Establishes the limit values for the current RTP loss rate. Range: 0.00 % to 100.00 % Default: ***0.00 %***
`Total RTP loss rate`	Sets the limit values for the RTP loss rate for the entire test. Range: 0.00 % to 100.00 % Default: ***5.00 %***
`Profile name`	Enters a name for the IPTV profile. See page 28 for details.

IPTV QoS (Quality of Service)		
Layer 3 DiffServ	Differentiated services: classification/priorisation of IP packets (L3)	
RTP (ToS/DSCP)	ToS	Type of service Field for setting the priority in the IP header of the usable data (RTP), see page page 138 for further details. Range: 0 to 0xFF Default: ***18***
	DSCP	Differentiated services codepoint Field for setting thepriorityin the DS field (6 Bits) of the usable data (RTP), see page 138 for further details. Range: 0 to 0x3F Default: ***00***
Layer 2 VLAN Prio	TheVLAN priorisation on layer 2 is an extension of the Ethernet header..	
VLAN Prio	VLAN priorisation of usable data. Range: 0 to 7 Default: ***0***	

17.1.1 Multiple virtual lines

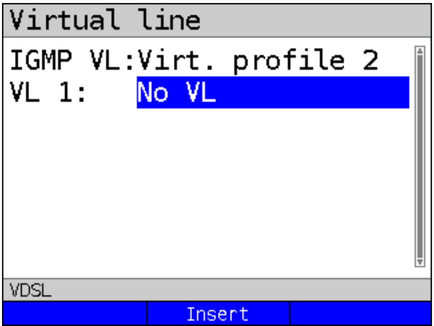
ARGUS can use up to 4 virtual lines for the service IPTV. The IGMP virtual lines are used for transmission of the IGMP protocol and virtual lines 1-3 for receiving the video/audio streams.

Overview: selected virtual line profiles

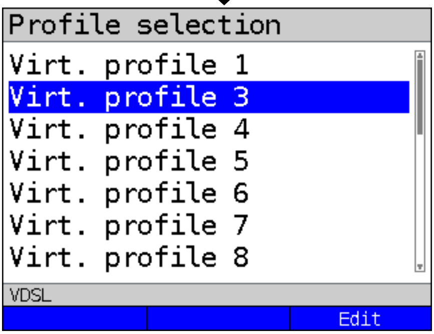


<Edit> Edits the selected virt. profile (in this example virt. profile 2), see page 103.

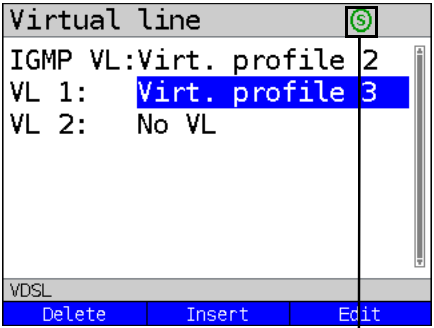
<More VLs> Opens virtual line selection for the service IPTV.



<Insert> Inserts further virtual profiles.



Adds selected VL profile for the service IPTV.

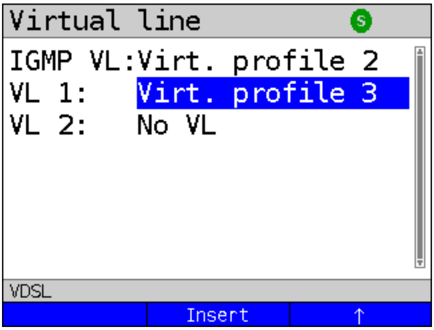


<Delete> Deletes the selected virt. profile (in this example profile 3) from the selection list.

<Insert> Inserts a further virtual profile.

<Edit> Deletes the selected virt. profile (in this example profile 3), see page 103.

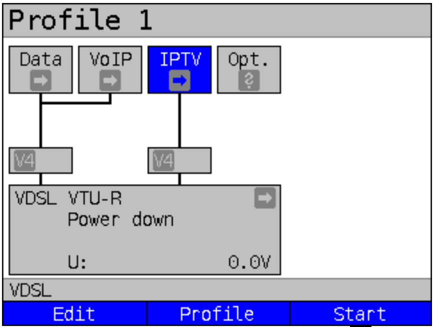
Switches to softkey assignment.



<↓> The marked profile is moved down one place in the list.

<↑> The marked profile is moved up one place in the list.

Starting IPTV

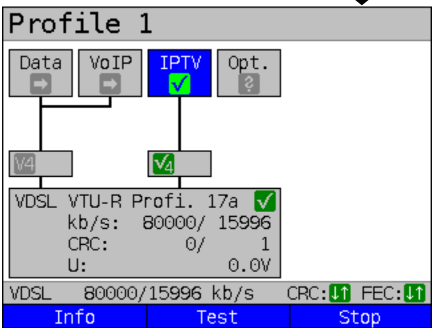


Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for IPTV.

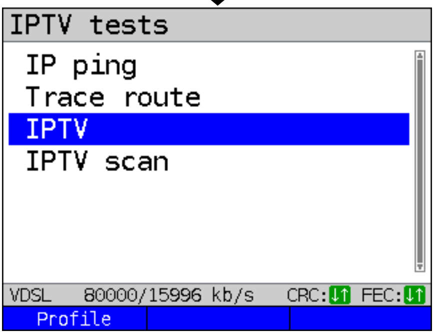
<Edit>	Assigns a virtual line is assigned to the service IPTV or edits it.

Activating the service IPTV.



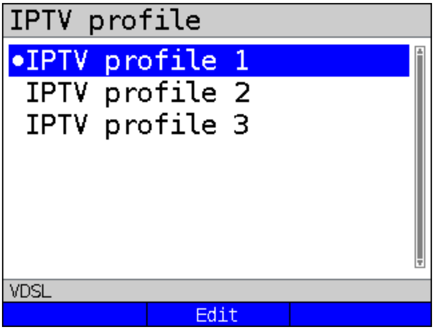
If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

<Info>	Duration of activation.
<Test>	Opens test selection.
<Stop>	Deactivates the service.



<Profile>	Displays the IPTV profiles, see page 200.

Continued on next page

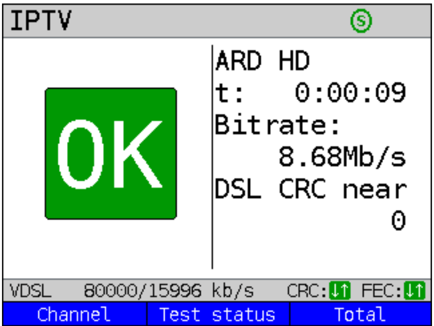


Marks the IPTV profile
(default is indicated with ●).

<Edit>	Edits the marked profile, see page 200 for changes to the individual parameters.

The IPTV test starts automatically.

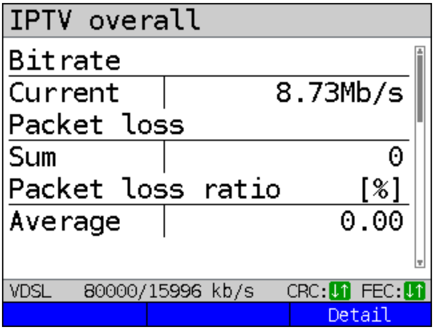
IPTV test



During the test, ARGUS displays the selected IPTV channel, the duration of the test and the current bitrate. If the set limits are exceeded, the IPTV test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

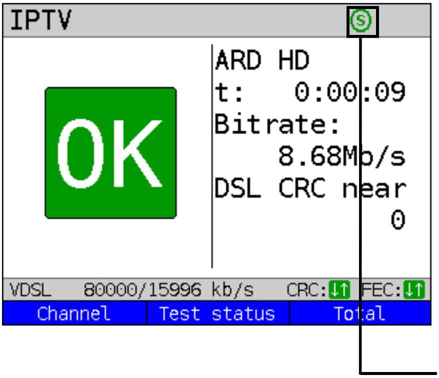
<Channel>	Selects a new channel.
<Test status>	Displays test status without ending the test or starting a new test, see page 232.
<Total>	Displays all IPTV statistics.
	Cancels test.

Continued on
next page



Display:
- Current bitrate
- Number of packets lost during the test
- Display of packet loss rate in percent

<Detail> Switches to the IPTV details.

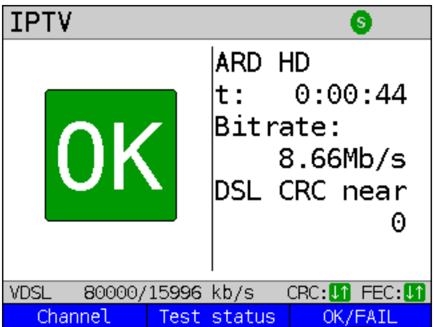


<Channel> Selects a new channel.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

Cancels test.

Toggles softkey assignment.



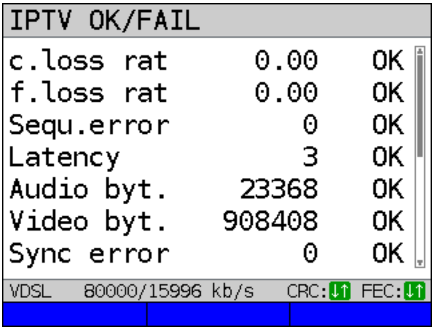
<Channel> Selects a new channel.

The IPTV test runs until a new channel is selected.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

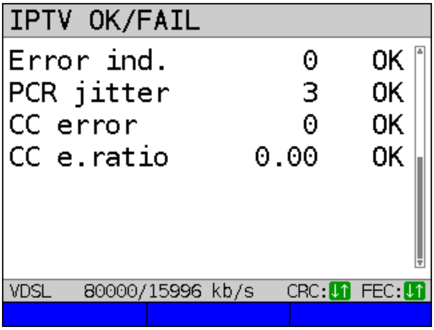
<OK/FAIL> OK/FAIL overview of the IPTV test.

Continued on next page



Display:

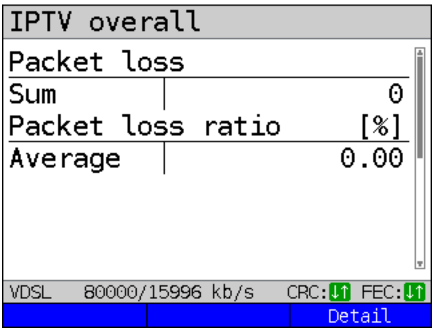
- Current loss rate in %
- Total loss rate in %
- Sequence errors
- Latency (in ms)
- Audio bytes (in Byte)
- Video bytes (in Byte)
- Sync error
- Error indication
- PCR jitter (in ms)
- CC error
- CC error rate (in %)



Stop IPTV

Stop IPTV test.

IPTV result

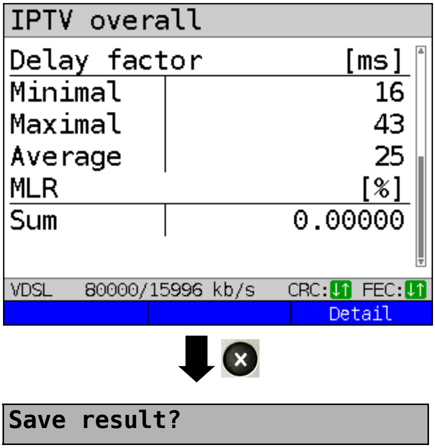


Displays how many packets were lost during the IPTV test and how high the loss rate is.

Display of further information:

- Minimum delay factor
- Maximum delay factor
- Average delay factor
- Media loss rate (MLR) during the test

`<Detail>` Displays IPTV test detail information, see page 211 and following.



Exits results.

For saving results, see IP ping page 142.
Sends trace file to PC, see page 113.

Overview of IPTV results

	Display / Description
Bitrate, packet losses, packet loss rate	Bitrate: current bitrate Packet losses: number of packet losses during the test Packet loss rate: Displays the packet loss rate in percent
Info: Delay factor, MLR	Current: Displays the current delay factor in ms Minimal: Displays the minimum delay factor in ms Maximal: Displays the maximum delay Factor in ms Average: Displays the average delay Factor in ms MLR sum: Displays the media loss rate (MLR) in percent
Info: channel	Test duration: Duration of test Name: Displays the name of the selected channel IP: Display of channel's IP address Port: Display of channel's port
IGMP latency, protocol, DSL CRC	IGMP latency: Displays the IGMP latency (switch-on time of program) in ms Protocol: Displays the selected IPTV protocols DSL CRC: Display of DSL-CRC error counter
Info: Packet loss	Current: Number of current packet losses Minimal: Number of minimum packet losses Maximal: Number of maximum packet losses Average: Number of average packet losses Sum: Number of packets lost during the test <MPEG2> Switches to MPEG2 details
Info: Packet loss rate	Current: Display of current packet loss rate Minimal: Display of minimum packet loss rate Maximal: Display of maximum packet loss rate Average: Display of average packet loss rate
RTP, DSL CRC	Error: Display of RTP errors Seq.error: Display of RTP sequence errors DSL CRC: Display of DSL CRC error (n/f)
Info: MPEG2 bitrate	Current: Display of current MPEG bitrate Minimal: Display of minimum MPEG bitrate Maximal: Display of maximum MPEG bitrate Average: Display of average MPEG bitrate
Info: MPEG2 packets	Current: Display of current MPEG packets Minimal: Display of current MPEG packets Maximal: Display of maximum MPEG packets Average: Display of average MPEG packets Sum: Sum of MPEG packets

`Info: MPEG2 bytes`	`Current:` Number of current bytes `Minimal:` Number of minimum bytes `Maximal:` Number of maximum bytes `Average:` Number of average bytes `Sum:` Sum of bytes
`Info:` `MPEG2 PCR jitter`	`Current:` Current PCR jitter in ms `Minimal:` Minimum PCR jitter in ms `Maximal:` Maximum PCR jitter in ms `Average:` Average PCR jitter in ms
`Info:` `MPEG2 CC errors`	`Current:` Number of current CC errors `Minimal:` Number of minimum CC errors `Maximal:` Number of maximum CC errors `Average:` Number of average CC errors `Sum:` Sum of CC errors
`Info:` `MPEG2 CC error rate`	`Current:` Number of current CC error rate `Maximal:` Number of maximum CC error rate

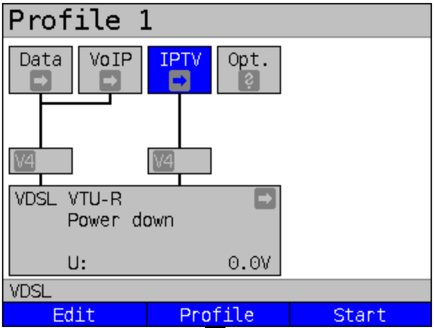
`Error Sync,`
`Indicat,`
`DSL CRC`
	`Sync:` Display of error sync
	`Indicat.:` Display of error indication
	`DSL CRC:` Display of DSL CRC error(n/f)

`Info: PID bitrate`	`Current:` Number of current PIDs `Minimal:` Number of minimum PIDs `Maximal:` Number of maximum PIDs `Average:` Number of average PIDs

17.2 IPTV scan

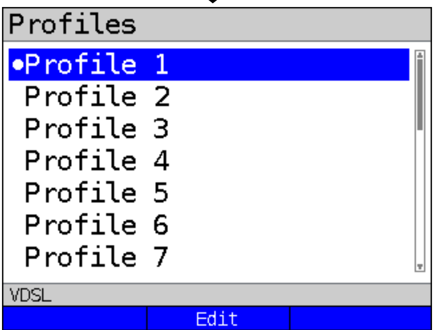
ARGUS checks the availability of TV channels. Additionally, ARGUS displays the switchover time between TV channels.
You can create three user-defined scan profiles. The following settings must be saved in the profile for the IPTV scan (when the xDSL, G.fast or Ethernet connection is already established, the connection parameters, e.g. target value, are locked):

Protocol-independent parameters:



ARGUS in status screen.

`<Edit>`	Assign virtual lines to the service IPTV.
`<Profile>`	See page 35 for profile settings.
`<Start>`	Starts the service.



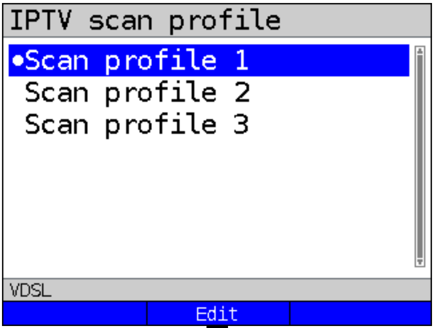
Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet or xDSL connection and conducting the IPTV scan.

ARGUS uses the marked profile as the default profile and switches to the menu Settings.

Test parameters

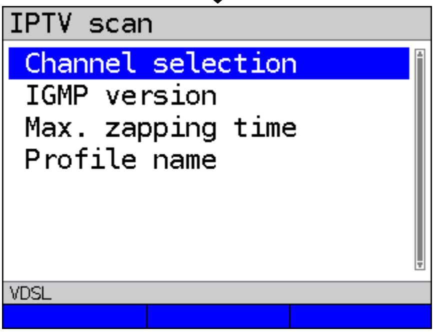
IPTV scan

Continued on next page



A total of three user-defined scan profiles are available.

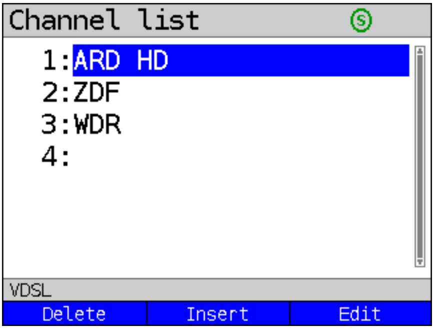
Edits the scan marked profile.



Edits and modifies the marked parameters

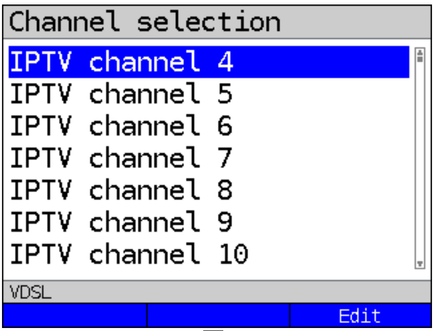
IPTV scan settings

Setting	Description
Test parameters:	
IPTV scan	You can create a total of three scan profiles. **<Edit>** Activates the profile you wish to edit.
Channel selection	The channels list can be used and edited in all profiles. You can store up to 250 channels. Using the software WINplus/WINanalyse you can also create a configuration conveniently using the PC and load it to ARGUS. Selecting the TV channels for the IPTV scan:



ARGUS initially displays the TV channels already selected in the set order that was tested for the IPTV scan. If no channels have been selected yet, the list is empty. The list slots can be filled one after another. You can select up to 250 channels.

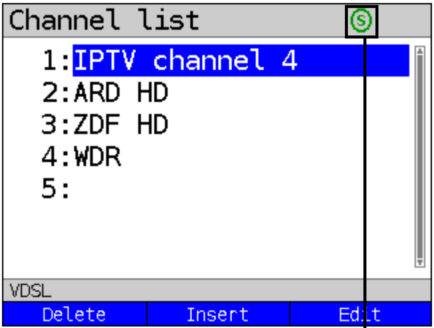
<Insert> Opens the list with the available channels.



Marks the channel
Channels already selected do not appear in the channel list (see channel selection display).

<Edit> Edits the marked channel, see page 200 and following.
- Enter (multicast IP and port number) of TV channel.
- Enter any alias name for the TV channel (e.g. name of broadcaster).

Continued on next page



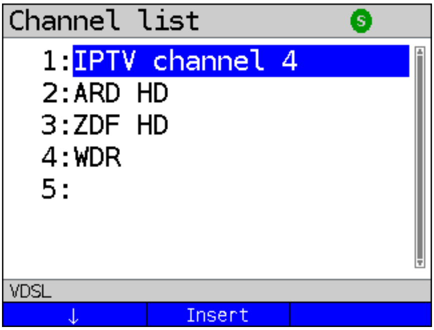
Add the marked TV channel (in this example IPTV channel 4), then add the next channel (in this example IPTV channel 5).

Once at least two channels have been added to the list, you can change their position in the list using the following softkeys.

<Delete>	Deletes the marked TV channel from the list.
<Insert>	Opens the channel list with the available channels.

Continued on next page

Toggles softkey assignment.



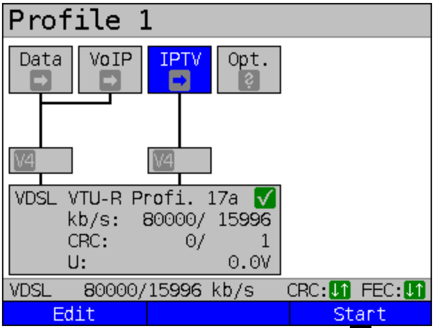
<↓>	The selected channel is moved down one place in the list.
<↑>	The selected channel is moved up one place in the list.

Accepts the channel selection in the order shown.

IGMP version	Version of the management protocol for joining/quitting a multicast group (for broadcast TV only). Range: 2 to 3 Default: ***3***

`Max. switch-over time`	Entry of max. switchover time (IPTV timeout): This is the time between the request and receipt of an IPTV channel. If the measured timeout exceeds the value set here, ARGUS rates this test as "FAIL". Range: 1 - 25 seconds Default: ***5 seconds***
`Profile name`	Entry of a name for the IPTV scan profile, see page 28 for details.

Starting the IPTV scan

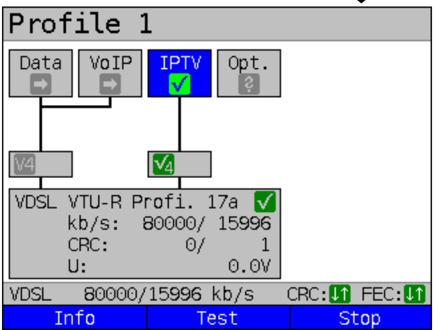


Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for IPTV.

<Edit> Assigns a virtual line to the service IPTV or edits it.

Activating the service IPTV.

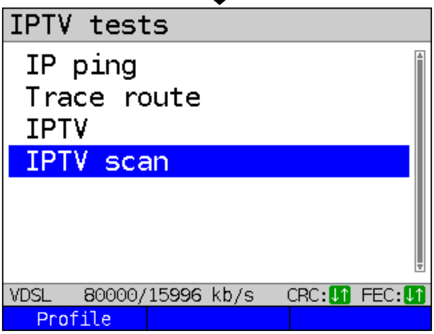


If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

<Info> Duration of activation.

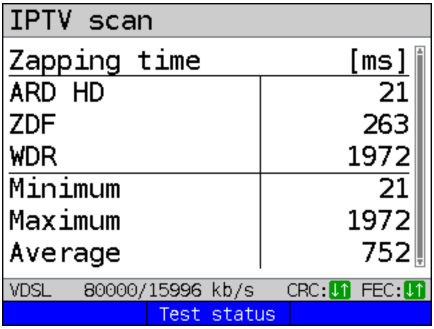
<Test> Opens test selection.

<Stop> Deactivates the service.



<Profile> Displays the IPTV scan profiles, see page 214.

IPTV scan



The IPTV scan starts automatically.

Displays the time needed to switch between channels. If a TV channel cannot be received within the set interval, ARGUS displays "FAIL".

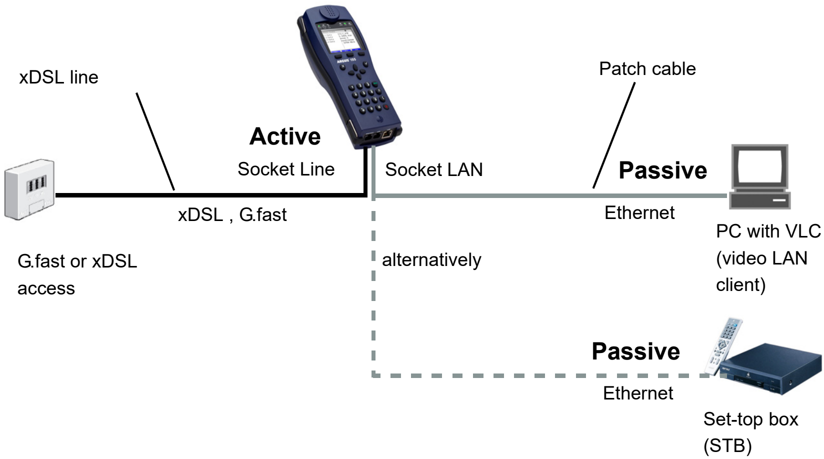
`<Test status>`	Displays test status without ending the test or starting a new test, see page 232.

Exits results display.

For saving results, see IP ping page 142.
Sends trace file to PC, see page 113.

17.3 IPTV passive

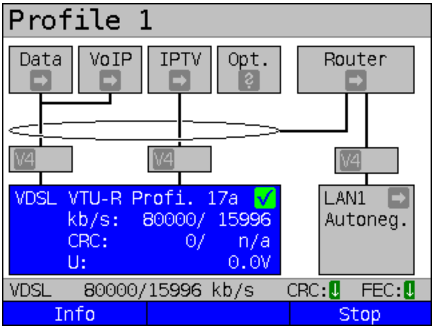
ARGUS listens for transmitted TV channels without requesting a channel. ARGUS lists the TV channels it detects in a list of multicast IPs and/or channel names.



⚠ A second ARGUS in STB mode can be connected in place of a PC or STB.

See page 199 and following for protocol-independent parameters and test parameters for IPTV passive.

Starting IPTV passive



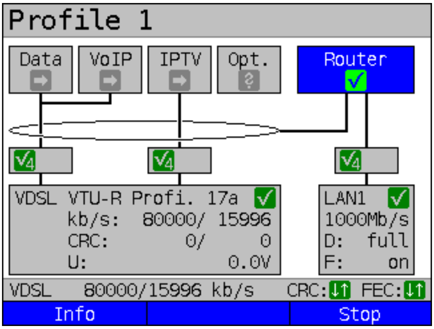
Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for IPTV passive.

⚠ IPTV passive can also be run in bridge mode. However, the bridge must be activated first.

Select the router using the cursor and start the test.

Router mode is started.

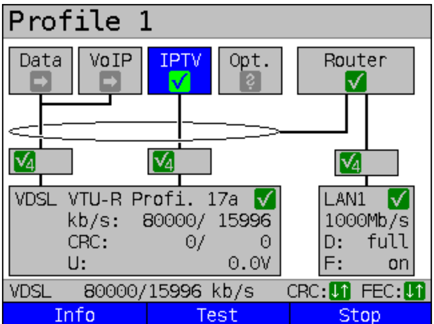


<Info> The duration of router activity is displayed.

<Stop> Stops router mode.

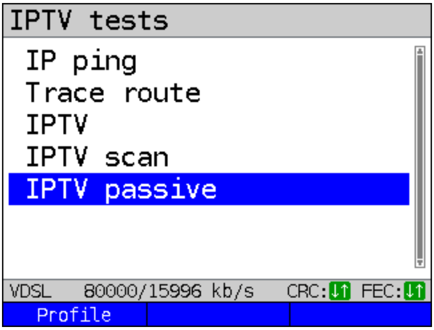
Select the service IPTV using the cursor and activate it.

The service IPTV and the router mode are active and the VDSL access is synchronous.

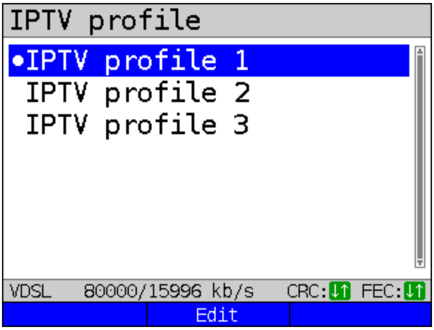


⚠ To access the softkey **<Test>** in bridge mode, switch to the bridge box and activate it.
The services are not available in bridge mode.

Continued on next page



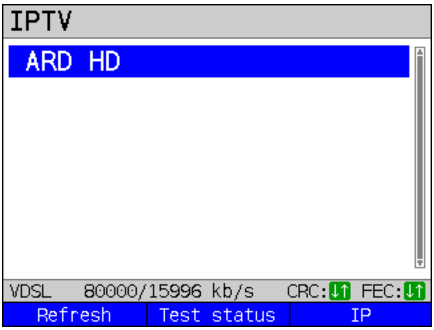
<Profile> Displays the IPTV passive settings, see page 200.



Marks the IPTV profile (default is indicated with ●).

<Edit> Edits the marked profile, see page 200 for changes to the individual parameters.

ARGUS automatically checks whether IPTV streams are available and displays these.



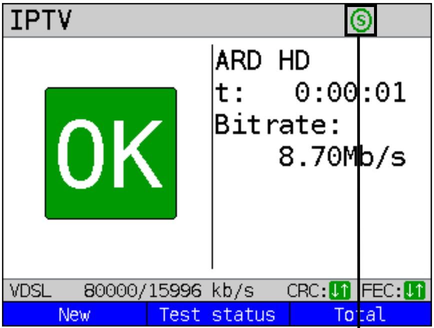
In this example, one possible stream is displayed.

<Refresh> Updates the channel list.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

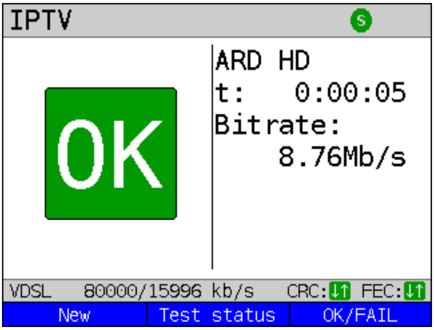
<IP> Displays the multicast IP of the selected channel.

Continued on next page



During the test, ARGUS displays the selected IPTV channel, the duration of the test and the current bitrate. If the set limits are exceeded, the IPTV test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

`<New>`	Starts a new IPTV test or selects another available channel, see page 222.
`<Test status>`	Displays test status without ending the test or starting a new test, see page 232.
	Toggles softkey assignment.
`<OK/FAIL>`	OK/FAIL overview of the IPTV test, see page 209.
	Cancels test.

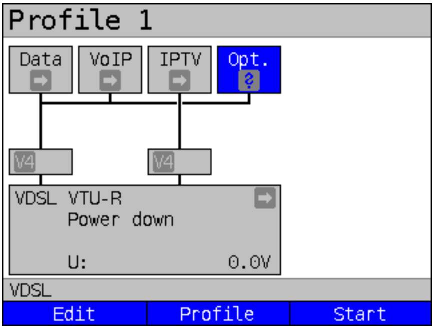


The IPTV result statistics are explained starting on page 209.

17.4 Video on demand (VoD)

In VoD mode, ARGUS requests a datastream from a VoD server. Depending on the access type, ARGUS replaces the STB or the modem and the STB.
VoD services are often provided using RTSP, as this control protocol additionally supports control functions. However, ARGUS also supports the protocols FTP, HTTP and MMS where needed. During the test, ARGUS monitors the regularity of the incoming packets, the loss of packets, packet and PCR jitter and other possible errors.
Depending on the preset limit values, ARGUS performs an OK/FAIL assessment and shows important metadata regarding the received VoD stream.
You can configure three user-defined VoD profiles (where the connection is already established, the connection parameters, e.g. the target value, are locked):

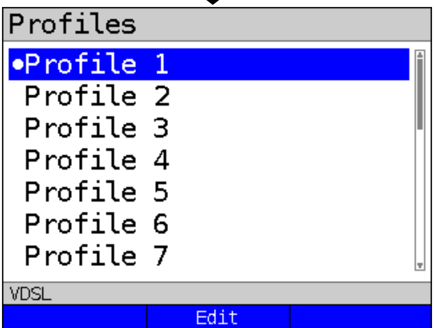
Protocol-independent parameters:



ARGUS in status screen.

The VoD test is performed using the service of that name.
The following example illustrates the procedure and its special features.

<Edit>	A virtual line is assigned to the service VoD.
<Profile>	See page 35 for profile settings.
<Start>	Starts the service.

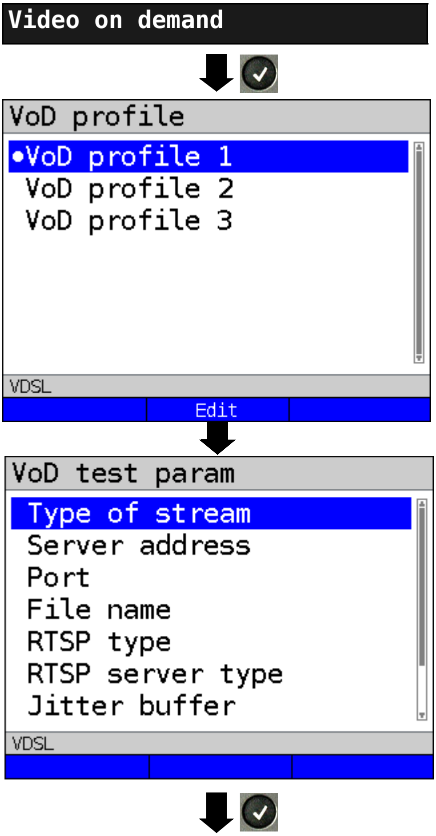


Select the profile you wish to edit. The selected profile appears in the display in blue. The default profile is indicated with a ● in the display. ARGUS adopts the parameters from the default profiles for establishing the Ethernet, G.fast or xDSL connection and conducting the VoD test.

Test parameters

ARGUS uses the marked profile as the default profile and switches to the menu Settings.

Continued on next page



A total of three user-defined VoD profiles are available.

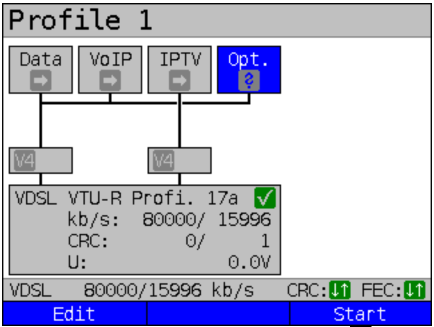
Edits the scan marked VoD profile.

Edits and modifies the marked parameters.

Setting	Description
Test parameters:	
`VoD:`	You can create a total of three VoD profiles. `<Edit>`Activates the profile you wish to edit.
`Type of stream`	Select the type of stream. You can select one of the following types: RTSP, HTTP, FTP, MMS Default: ***RTSP***
`Server address`	Enter the server address from which the stream is to be downloaded. Enter the address using the number keys. Toggle entry using the softkey (meaning of right softkey changes when pressed), see page 138.

`Port`	Specification of port. Range: 0 to 65535 Default: ***0***
`File name`	Name of the file to be downloaded from the server, see page 138 for information on using the softkeys.
`RTSP type`	Type of control protocol: TCP or UDP. Default: ***TCP***
`RTSP server type`	If the remote station is a standard-compliant VoD server, always set the field "RTSP server type" to "standard". If the remote station uses proprietary features, you can use a different setting (e.g. Kasenna). Default: ***Standard***
`Jitter buffer`	Size of jitter buffer. Ideally, enter the value from the upstream STB. Range: 0 to 5000 ms Default: ***300 ms***
`Threshold values`	Sets the limit values for PCR jitter and continuity error (assessment of picture quality). When these values are exceeded during the IPTV test, the display shows the test result "FAIL", otherwise "OK". PCR jitter: - Range: 0 to 10,000 ms - Default: ***8 ms*** Continuity error: - Range: 0.0 - 100 percent. - Default: ***0.1 %***
`Profile name`	Enter a name for the VoD profile. See page 28 for details.

Starting VoD

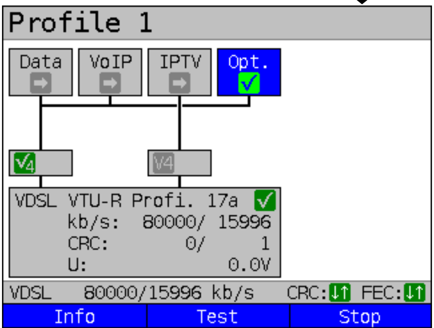


Connecting the service.

The profile selected for xDSL connection (in this example profile 1) is also used for VoD.

<Edit> Assigns a virtual line to the service VoD or edits it.

Start the service VoD.

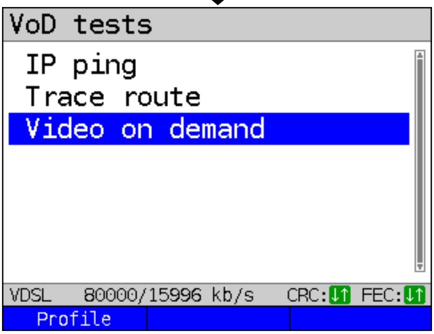


If no xDSL connection is established, ARGUS automatically connects at this point using the default profile (see page 57).

<Info> Duration of activation.

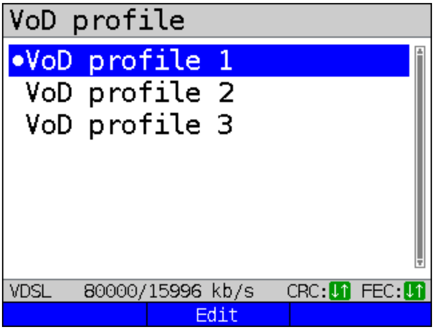
<Test> Opens test selection.

<Stop> Deactivates the service.



<Profile> Displays the VoD profiles, see page 225.

Continued on next page

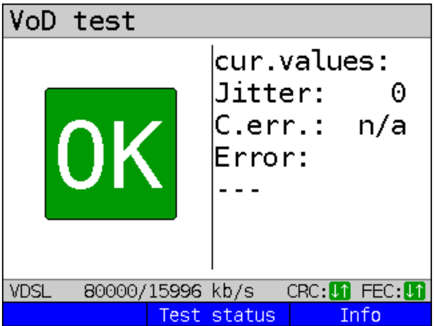


Marks the VoD profile (default is indicated with ●).

<Edit> Edits the marked profile, see page 200 for changes to the individual parameters.

The VoD test starts automatically.

VoD test



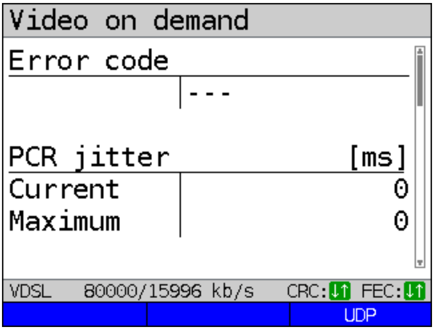
During the test, ARGUS displays the current PCR jitter and the continuity errors. If the set limits are exceeded, the VoD test shows "FAIL" in the display, otherwise "OK".
ARGUS displays "FAIL" until the values fall below the threshold again.

<Test status> Displays test status without ending the test or starting a new test, see page 232.

<Info> Displays the video on demand test statistics.


Cancels test.

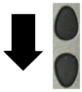
Continued on next page

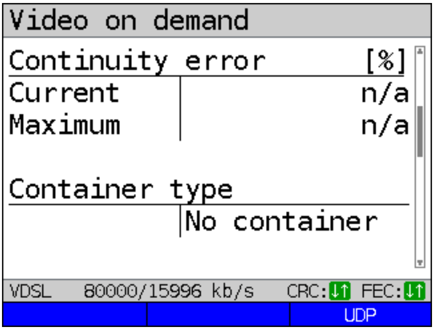


Display:

- Displays the current error status
- Displays the current and maximum PCR jitter

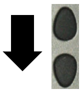
<UDP> Switches to UDP information, see page 230.

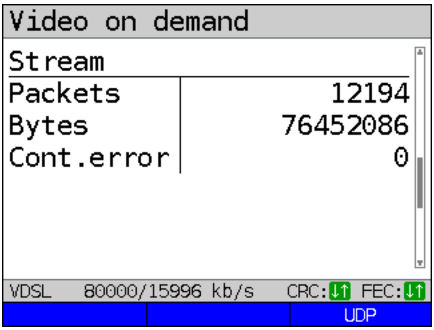




Display:

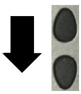
- Displays the current and maximum continuity error in %
- Display of container type



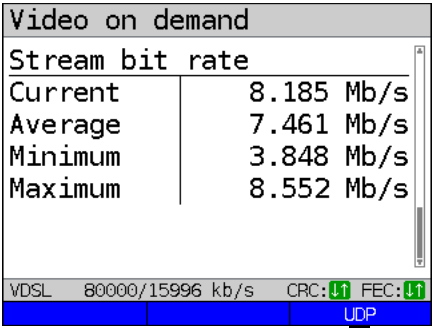


Display:

- Display of stream packets
- Display of stream bytes
- Display of stream cont. errors

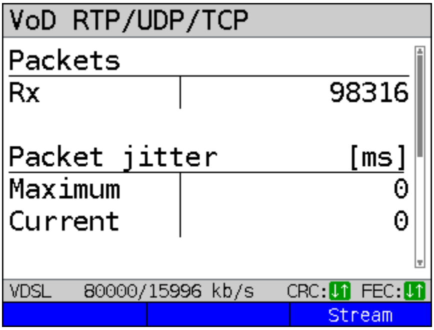


Continued on next page



Display:

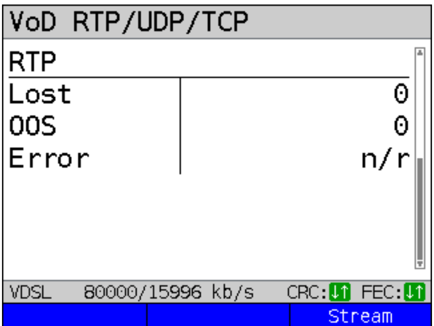
- Current stream bitrate
- Average stream bitrate
- Minimum stream bitrate
- Maximum stream bitrate



Display:

- Received packets
- Maximum packet jitter
- Current packet jitter

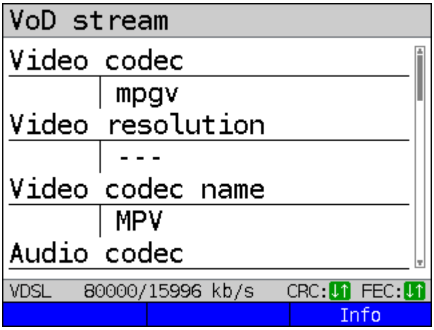
<Stream> Switches to stream information, see page 231.



Display:

- Lost RTP packets
- OSS RTP packets
- Number of errored RTP packets

Continued on next page

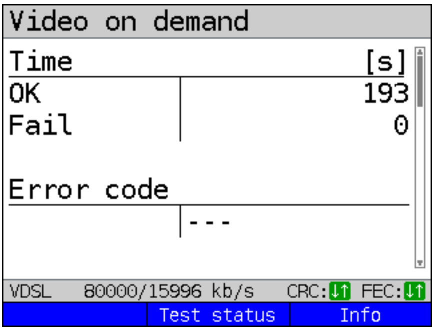


Stop VoD test

Display:

- Video codec
- Video resolution
- Video codec name
- Audio codec
- Audio channels
- Audio sampling rate
- Audio bits/sample
- Audio bitrate
- Audio codec name
- Audio codec desc.
- Total runtime
- Author (general)
- Title
- Author (meta)
- Copyright

VoD result



Displays the duration of the test, the result OK or FAIL, and the error status.

The further test results are described starting on page 229.

Exits results.

For saving results, see IP ping page 142.
Sends trace file to PC, see page 113.

18 Parallel tests

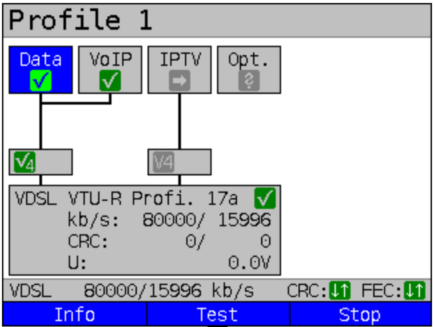
ARGUS permits parallel testing of different IP-based services (Data, VoIP, IPTV and Opt.) running on xDSL, G.fast or Ethernet interfaces.
The settings for each test are described in the respective chapters.

The following tests can be run in parallel. Any combination of the tests listed here is possible. Up to ten tests can be conducted concurrently.

Service	Test	Remark
Data	IP ping*[1], see page 137	For theses tests, up to 10 tests can be conducted concurrently (incl. tests using the other services).
	Traceroute*[1], see page 143	
	HTTP download, see page 147	
	FTP download, see page 154	
	FTP upload, see page 156	
	FTP server, see page 160	See remark for VoIP.
	Textbrowser, see page 167	
	Network scan*[2], see page 171	
VoIP	VoIP call, see page 176	These tests can be combined with any other test. Please note that a total of ten simultaneous VoIP connections are possible.
	VoIP wait, see page 194	
	VoIP call generator, see page 196	
IPTV	IPTV, see page 199	These tests can be combined with any other test. Note that only one IPTV test can be active at any time.
	IPTV scan, see page 213	
	IPTV passive, see page 220	

Opt.	IP ping*[1], see page 137	For theses tests, up to 10 tests can be conducted concurrently (incl. tests using the other services).
	Traceroute*[1], see page 143	
	HTTP download, see page 147	
	FTP download, see page 154	
	FTP upload, see page 156	
	FTP server, see page 160	See remark for IPTV
	Textbrowser, see page 167	
	Network scan*[2], see page 171	
	VoD, see page 224	See remark for IPTV
	*[1] Also possible via the services VoIP, IPTV and Opt. *[2] only Ethernet	

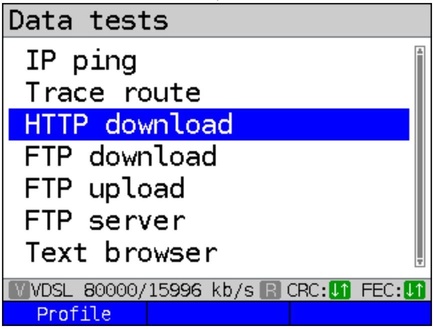
The possibility of parallel testing is illustrated using HTTP download and VoIP via the services Data and VoIP. Display and operation for further parallel tests, e.g. IPTV, is performed in the same way as for Data and VoIP.



ARGUS status screen.

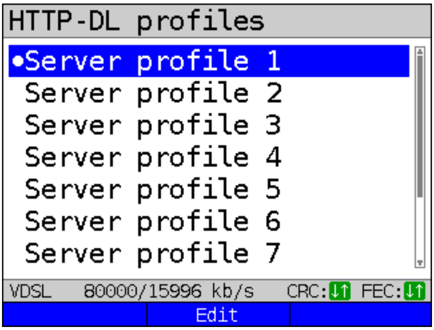
The VDSL VTU-R access shown in the example and the services Data and VoIP are active.

<Info>	Duration of activation
<Test>	Opens test selection.
<Stop>	Deactivates the service.



e.g. select HTTP download

<Profile> Displays the available HTTP download profiles, see page 147.

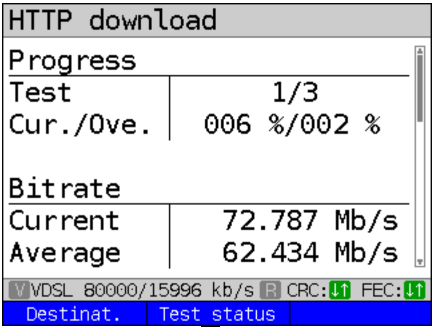


Mark the server profile:
(default is indicated with ●).

<Edit> Edits the marked profile, see page 147 for changes to the individual settings.

HTTP download starts automatically.

HTTP download



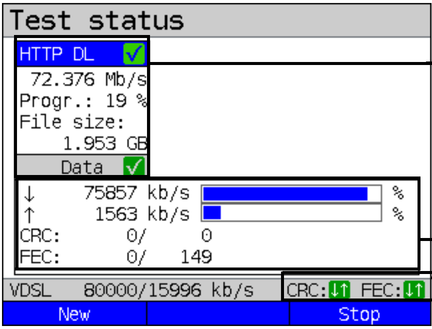
Display during HTTP download:

- Current download/total number of downloads, in this example the first download attempt out of three (1/3) is displayed.
- Current and overal Data transferred (in this example 6 % / 2 %)
- Current net download rate (in this example 72,787 Mbit/s)
- Current net average download rate (in this example 62,434 Mbit/s)

See page 150 for further result parameters.

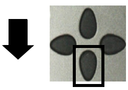

Cancels test

Test status



Display of test status:

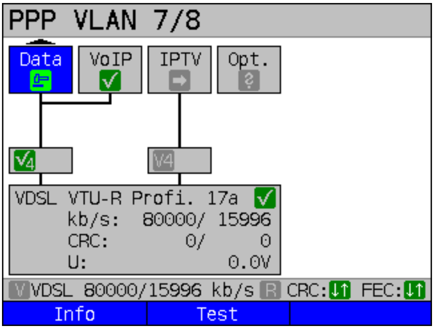
- Currently selected test as well as test-dependent result parameters, in this example the current net download rate, the current progress and the size of the file to be transferred.
  The display of results depends on the respective test. See the chapter on the individual test for more information on the result parameters.
- The current download in kbit/s is represented as a percentage of the entire downstream range.
- The current upload in kbit/s is represented as a percentage of the entire upstream range.
- Number of CRC and FEC errors in down- and upstream


Cursor down

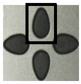

or

Switches to the test result parameters, in this example for HTTP download.

<Stop> Stops the test, in this example HTTP download.



ARGUS in status screen.



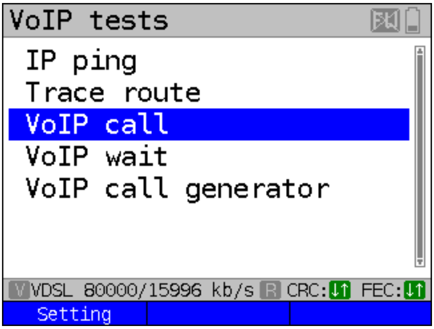
Opening test status

<Info> Duration of activation.

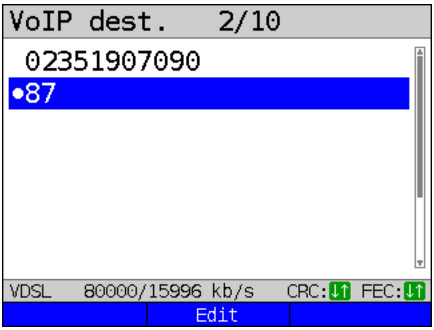
<Test> Opens test selection.

Switches to the test result parameters, in this example for of HTTP download.

Switch to the service VoIP using the cursor keys and open test selection.



e.g. select VoIP call

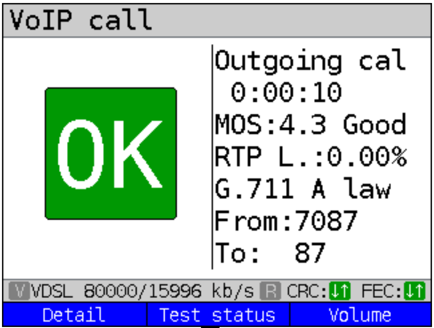


Mark the VoIP destination (default is indicated with ●).

Scroll down with the cursor, mark a blank line and add a new VoIP destination using <Edit>.

<Edit> Edits the VoIP destination number.

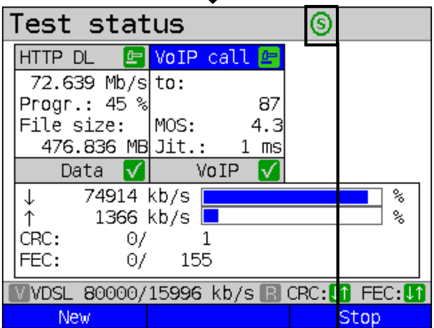
Connecting



The called subscriber has taken the call ("Connected!"), see page 185.

`<Info>` Displays the VoIP parameters.

`<Volume>` Opens volume control.



ARGUS executes an HTTP download and a VoIP call in parallel.

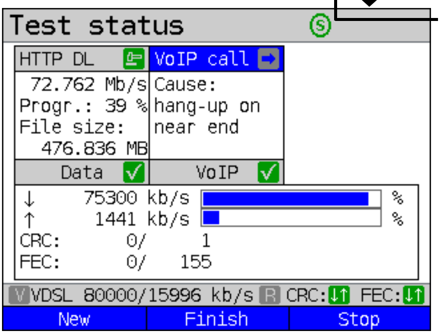
When more than one test is executed, you can select the tests with the left and right cursor keys. For more than three tests, the test row expands to the right.

`<New>` Selects a new single test.

`<Stop>` Stops the test, in this example VoIP call. Depending on the test, it can be reinitialised using `<Start>`. The configuration remains unchanged.

`<Finish all>` Stops all tests.

Toggles the softkey assignment.



The VoIP call is stopped.

⚠ To start a new VoIP call test, the old one must be cleared by pressing  twice.

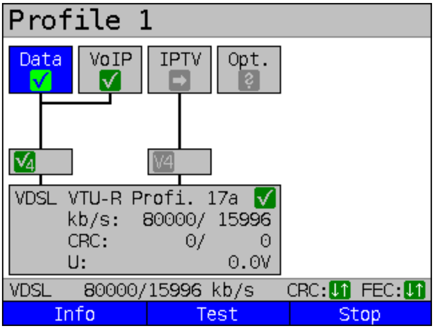
 or  Switches to the test result parameters, in this example from HTTP download.

`<New>` Selects a new single test.

`<Stop>` Stops the test.

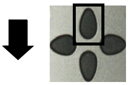
19 Auto tests

Concurrent tests (s. chapter 18 page 232) can also be executed automatically in an auto test. To do this, you can save different test scenarios in up to five auto test profiles.
The same rules as for the individual tests apply for the settings, execution and control.

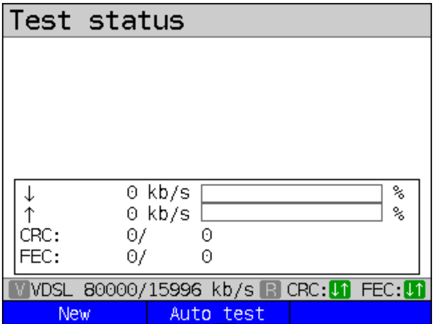


ARGUS in status screen.

Physical layer, virtual line and two of the services are successfully activated (in this example Data and VoIP).



Cursor up

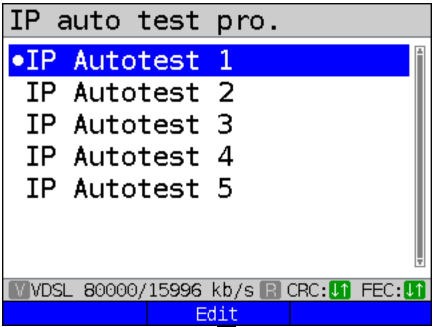


ARGUS in test status

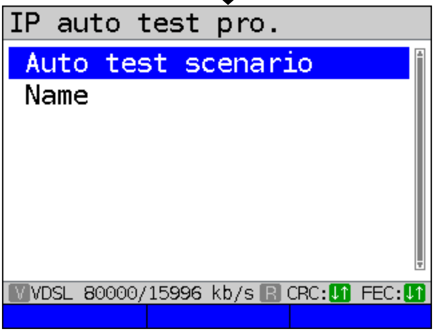
No test has been started yet.

<New>	Selects a new individual test.
<Auto test>	Opens auto test profiles.

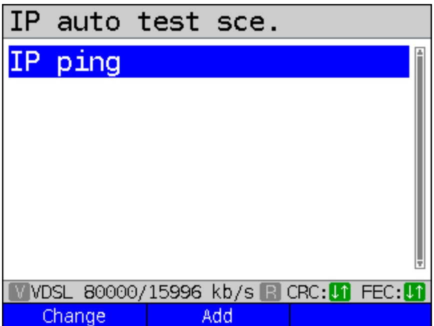
Continued on next page



ARGUS lets you preconfigure up to five auto test profiles.



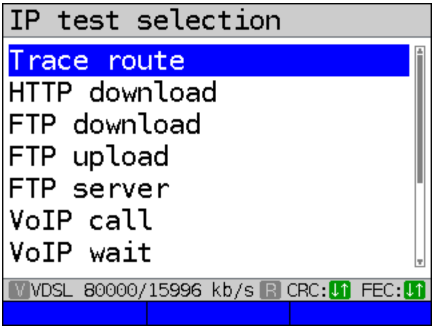
Define a scenario. You can configure up to ten individual tests (see page 232).
The number of tests (e.g. IP ping, download, VoIP ...) is limited to ten; IPTV can be selected only once (see page 232).



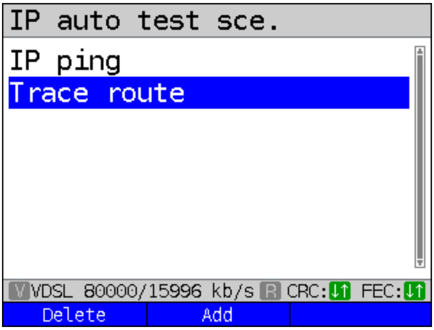
In general, at least one IP ping test is always preconfigured.

<Change>	Replaces IP ping with a different test.
<Add>	Adds a further test.

Continued on next page

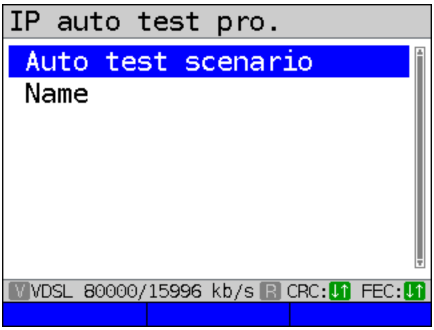


Select the desired test and confirm with

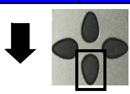


In addition to the IP ping test, a traceroute test is also started automatically and simultaneously via the auto test profile.

<Delete>	Removes the test from the list.

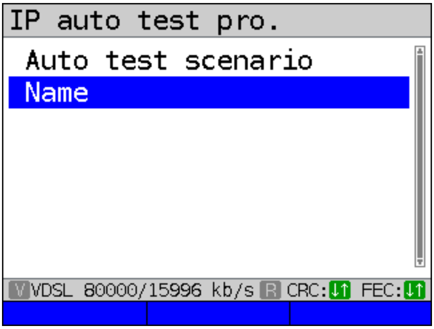


The scenario is accepted and saved.

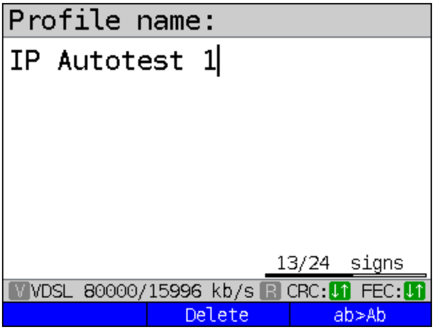


Cursor down

Continued on next page



Select “Name” to name the autotest.



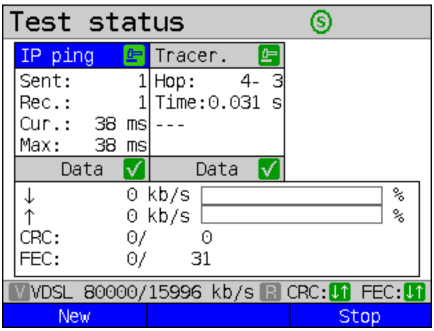
Give the auto test a name, like “triple-play test” or similar.
Use the alphanumeric keyboard.

Exit auto test setup by pressing twice and then start the test with .

see page 235 for instructions.

2x

1x



The individual tests are configured as described starting on page 137.

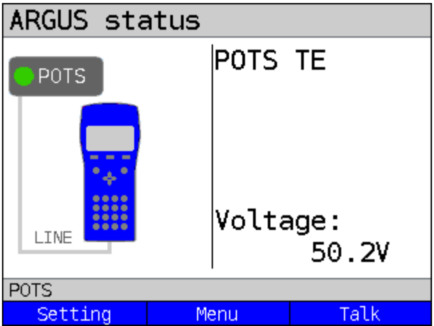
20 Operation on a POTS access

The voltages on the subscriber line may not exceed 130 VDC and should be free of AC voltage.

20.1 Setting the POTS Interface

Use the included connection cable to connect the ARGUS (Line jack) to the POTS access to be tested and then switch the ARGUS on. The POTS settings are made in the chapter 5 Configuring accesses page 25. In this example the POTS TE mode was selected:

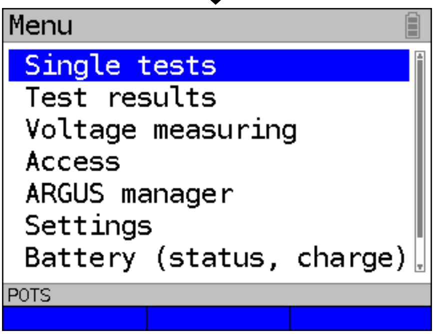
ARGUS State Display



The ARGUS displays the voltage on the line when it is "on hook“ (not busy).
Positive voltage: Polarity on a+; on b- (red wire is a, black wire is b)
Negative voltage: Polarity on a-; on b+

`<Setting>`	Opens the Settings menu for POTS parameters, see page 243.
`<Menu>`	Open the Main Menu
`<Call>`	For information on setting up a call, see page 245.

Main Menu



The various menus available for the selected type of access will be shown in the Main Menu.

The ARGUS will open the marked menu (in this example, Single tests).

Select a menu. The selected menu will be marked blue in the display.

Return to the previous menu (in the example, the State display).

Note: Open the Main Menu and select "Help" or press number key "1". An overview of the possible key combinations can be found on page 311.

20.2 POTS Settings

It is possible to configure the following "POTS Settings". The default settings can be restored at any time (see page 303).

Setting	Explanation
`POTS`	
`Dial mode`	Selection of the dial mode: DTMF or pulse dialling Default setting: ***DTMF***
`CLIP Mode`	Select the transfer procedure used to pass the call number: **FSK** CLIP via FSK (Frequency Shift Keying) For Germany and some other places in Europe **DTMF** CLIP via DTMF (Dual-tone multi-frequency) For Scandinavia and the Netherlands The ARGUS will automatically detect that a CLIP was sent using DTMF with the polarity reversal and will set itself accordingly (e.g. Netherlands). Default setting: ***FSK***
`DTMF parameter`	Settings for the three parameters Level, Duration and Interval of the DTMF signals generated during POTS (analogue) operation.
`Level`	Setting the DTMF level: The level can range between -30 dB and +9 dB. Use the cursor keys to raise or lower the level by 3 dB. Range: -30 to +9 dB Default setting: ***-3 dB***
`Time`	Setting the DTMF time: Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps

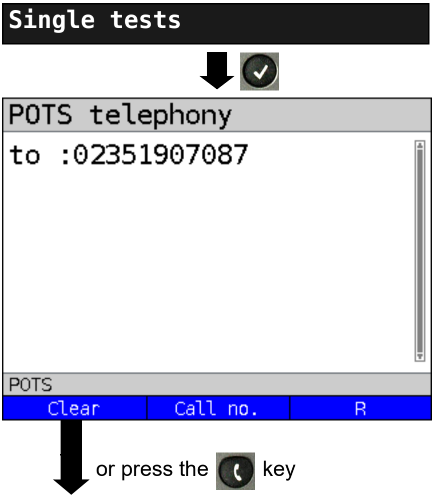
`Interval`	Setting the interval between two DTMF characters: Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps
`Defaults`	Restores the default settings: Level = -3 dB, Time = 80 ms, Interval = 80 ms
`FLASH time`	Sets the length of a FLASH. This setting is needed in order to use special features of a PBX. Range: 40 to 1000 ms Default setting: ***80 ms*** Use the cursor keys to raise or lower the setting: In the range 40 - 200 ms: 10 ms steps In the range 200 - 300 ms: 20 ms steps In the range 300 - 1000 ms: 100 ms steps

For information on restoring the default parameter settings, see page 305.

20.3 Connection on a POTS Access

Outgoing Calls

The ARGUS sets up a connection to another terminal. If the terminal at the other end is a telephone, the handset integrated in the ARGUS or a headset can be used to hold a conversation.



or press the key

Clearing the connection

For information on the ARGUS in the "POTS telephony" access mode, see page 242.
The ARGUS - Main Menu

<Call> or — Setup the connection: Enter the number on the keypad. Each of the number's digits will be dialled individually. The ARGUS will display the number dialled. As soon as the remote party answers, a voice connection will be set up.

<Call no.> — The ARGUS will display the last number dialled (simplified last number redial) or that of the last caller.

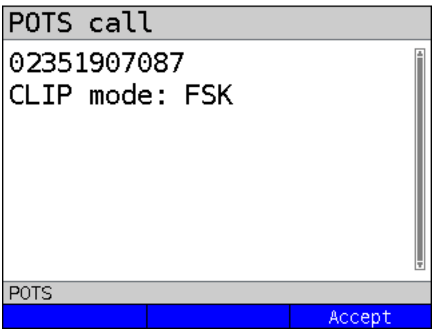
<R> — Generate a FLASH signal.

Scroll through the speed-dialling memory to select a different number or enter a new one using the keypad.

⚠ Simplified overlap signaling using the key: and the ARGUS will immediately open the POTS telephony display. Once the call number is entered, the call will be setup.

Incoming Call

The ARGUS signals an incoming call both audibly and on the display.



If the access supports CLIP, the ARGUS will display the number of the caller (for information on CLIP mode, see page 243).

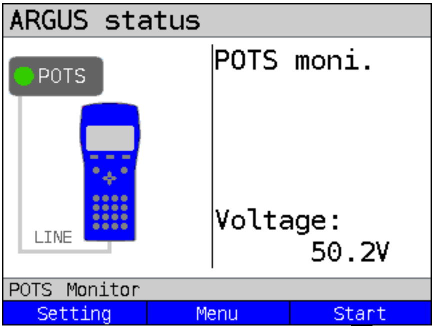
<Accept> or — Accept call

⚠ The call number received will be saved in the “Last caller” memory location.

20.4 POTS Monitor

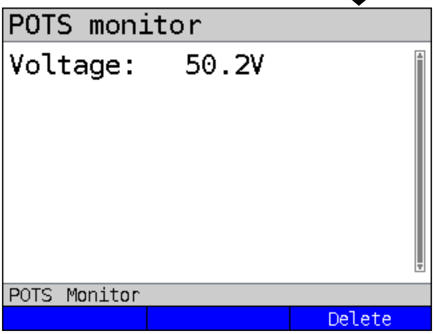
The POTS monitor function provides a high impedance tap (for listening-in) that does not influence the interface. You can listen-in on the line with the integrated handset or a headset without having the ARGUS send on or otherwise influence the interface.

The POTS monitor settings are made in the chapter 5 Configuring accesses page 25.



The ARGUS displays the voltage level on the line when it is “on hook” (not busy).

Start Monitoring



The ARGUS displays the voltage (when "off hook"), the number of the caller (if CLIP is supported) and the DTMF characters dialled by both telephone subscribers.
Any received DTMF characters will be appended to the line, which will shift left for each character once it is full. An incoming call will be signalled acoustically.

Press to display additional information, if available on the access

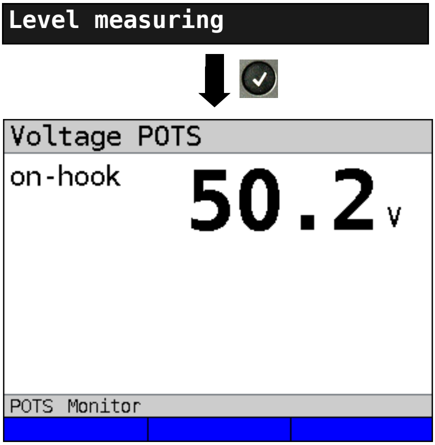
<Loud> Increase volume (The microphone is off.)

<Delete> Clears the display.

Stop monitoring and the ARGUS will open the State Display.

20.5 Level Measuring on a POTS Access

The ARGUS measures the voltage level in both the normal case and when the line is “busy” (trunk line).



ARGUS Main Menu

Start Measurement

The ARGUS will display the polarity of the 2-wire POTS line (red wire "a"; black wire "b") as well as the "on hook" and "off hook" voltage levels.

<New> To repeat the measurement

 Open the Main Menu

21 Copper tests

In the Access menu, ARGUS offers the menu option "Copper tests", which enables you to investigate the physical properties of the line.
This chapter briefly describes how to use the various functions. It is not possible to describe the interpretation of the results in the customary detail here. As the results are usually provided in graph form, they can only be interpreted correctly in conjunction with a knowledge of the line being measured. ARGUS supports this using a variety of aids, such as the Zoom and Cursor functions.

Note:
The Ethernet cable tests are described in chapter „22 Ethernet cable tests“ (see page 277).
The ARGUS Copper Box is described in a separate Copper Box manual.

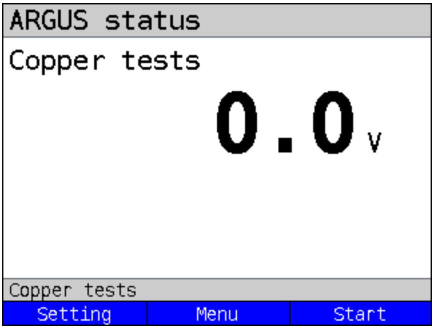
21.1 Line scope

With the line scope, ARGUS performs a real-time analysis on the connected line. The high-ohm line scope can e.g. be patched into an existing link between modem and DSLAM. You can display the results in either the time or frequency range (FFT).

The voltage on the line may not exceed 200 V DC or 100 V_{pp} AC.

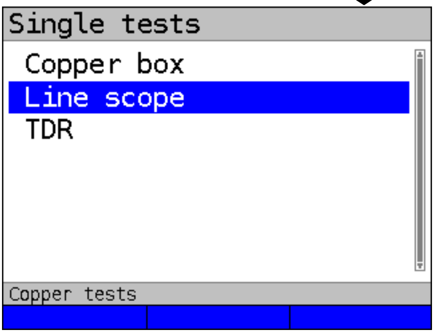
21.1.1 Starting the line scope

The chapter "Configuring accesses", page 30, explains how to set up the access type "Copper tests".



ARGUS status display.
Any DC voltage on the line is indicated here.

<Menu>	Switches to main menu.
<Start>	Directly accesses "Single tests" menu.



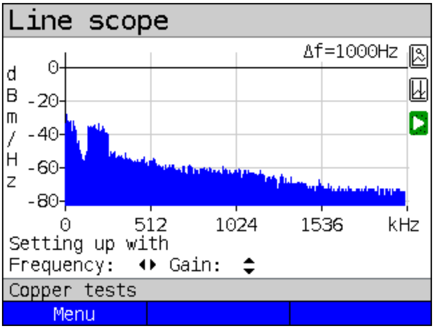
Select one of the Copper tests.
- Copper box
- Line scope
- TDR

Start the desired copper test directly by selecting it.

In this example, line scope.

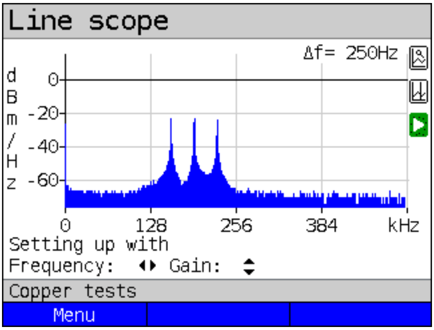
Continued on next page

Line scope status display



The line scope can identify a variety of states or occurrences on the line.
This example shows the ADSL (Annex B) connection with ISDN-U interface established between the modem and DSLAM.
The line scope is located in direct proximity to the modem, as it is particularly effective upstream in the spectrum.
If the upstream were significantly less than the downstream, it would be in direct proximity to DSLAM.

<Menu>	Opens the graph function, see page 252



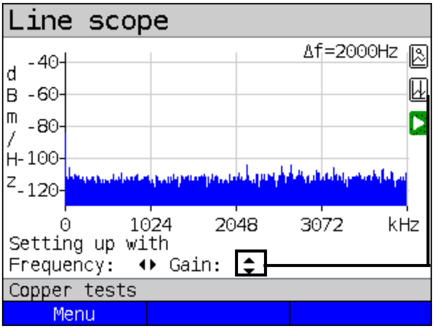
Finding the modem:
In addition to the general state of the line/ connection, a variety of events can be detected.
In this example, we can see the handshake tones that a modem connected to the line sends periodically in order to establish a connection with the DSLAM.
This also reveals whether or not an active modem is connected to the other end of the line.

In addition to the wanted signals such as the DSL spectrum or the handshake tones, the line scope can also detect unwanted signals such as temporary interference sources (real-time operation) or peculiarities in noise (with respect to background noise).

Connection example without probe:

Gain:

To ensure optimum detection of different signals, match the gain (y-axis) with the reduction of the frequency range shown (x-axis). ARGUS always begins with the lowest gain (-26 dB in the frequency range up to 3 MHz). Measuring range: -130 to +10 dBm/Hz.

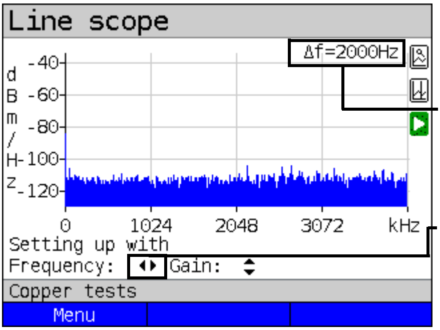


Gain-Y: Gain settings:
-26 dB, - 20 dB, 0 dB, 20 dB

ARGUS displays all measurement results as dBm/Hz values. These values are only comparable with others when the resolution of the measured frequency band is taken into account, as here the total energy of the frequency band is determined "per Hz". The bandwidth ARGUS is measuring is indicted in the display as Δf .

Frequency range:

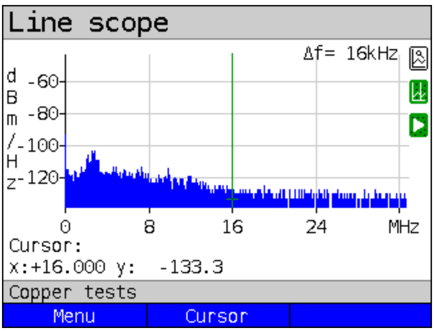
A frequency range of from 20 kHz to 30 MHz is available for measurement; the resolution varies depending on the selected range.



The bandwidth Δf at the top right in the display shows which frequency range is being shown in the display.

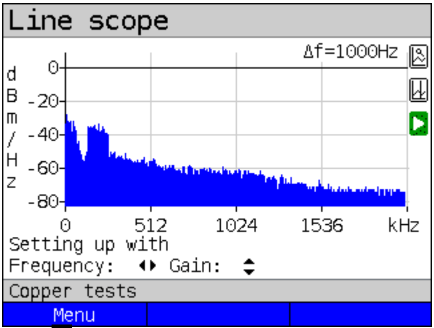
Frequency-X: Setting the displayed frequency range. Every press of the cursor key halves, respectively doubles the displayed range.

Example:



In a measuring range up to 32.768 MHz, up to 2048 values can be displayed, so:
Δf = 32,768 MHz / 2048 values = 16 kHz.
Consequently, a y-value marked by the cursor and displayed (in this example 16 MHz) is the mean (in this example -133.3 dBm/Hz) across the frequency range of 16 MHz - Δf/2 to 16 MHz + Δf/2, or 15.992 MHz to 16.008 MHz.

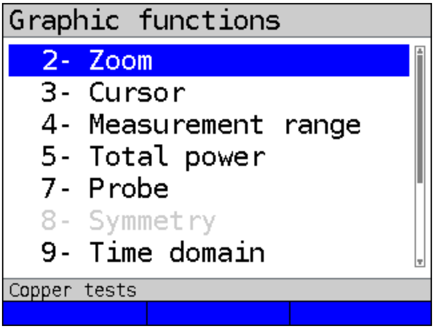
21.1.2 Graph functions



The graph functions Zoom and Cursor enable detailed analyses of the graphs.

<Menu> Opens graph functions.

Press in the status display (in the graph) to save the results and stop the line scope.



The "Graph functions" menu opens:

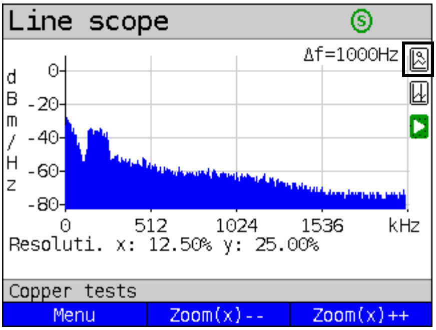
Exits the menu without changing.

You can also use this number key to activate the Zoom function within a graph.

The function of the cursor is described on page 253.

Accepts the selection and returns to the graph.

Zoom (2):



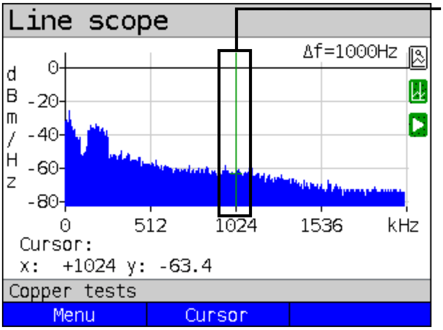
The magnifying glass shown in the display rests on a white background.
It has not yet been zoomed.
When the magnifier is over a dark background, the graph is zoomed.

<Zoom(x)++> Magnifies the middle section of the graph (100%).

<Zoom(x)--> Not yet zoomed! Reverses <Zoom(x)++> and resets magnification.

Shift lets you toggle the meaning of the softkeys and choose between x-axis and y-axis zoom, see page 64.

Cursor (3):



When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.

The values of the graph for the position under the cursor are displayed in the graph as follows:

x: +1024 kHz (accuracy ± 1 %)

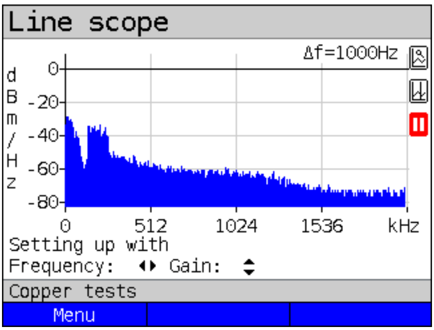
y: -63.4 dBm/Hz (accuracy ± 2 dB)

⚠ When the Stop function (see page 258) is activated, you can move the cursor faster.

You can use the left and right cursor keys to move the cursor to any position on the graph to measure it.
Briefly pressing a cursor key causes the cursor to jump to by one position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

The zoom function and the cursor function can also be combined. For example, you can determine a certain value using the cursor more easily when you have previously zoomed in on a specific range. However, the starting position of the cursor can vary.

Measuring range (4):

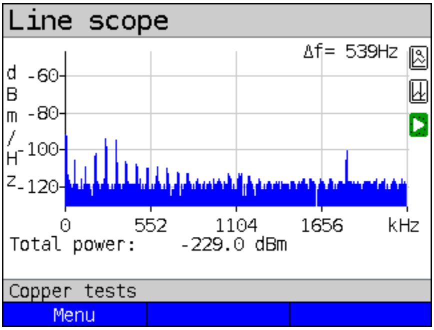


When the line scope starts, it is in the measuring range in the status display. You can set the frequency range (x) and the gain (y) in the measuring range. If you have hidden the measuring range in order to work with the cursor or zoom, you can restore it:

<Menu>

or  Restores measuring range.

Total power (5):

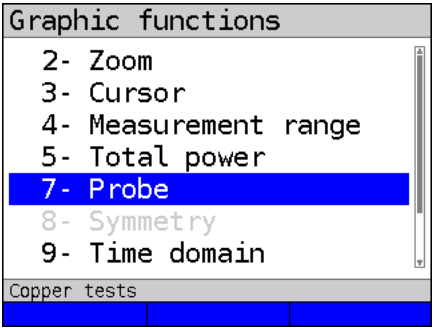


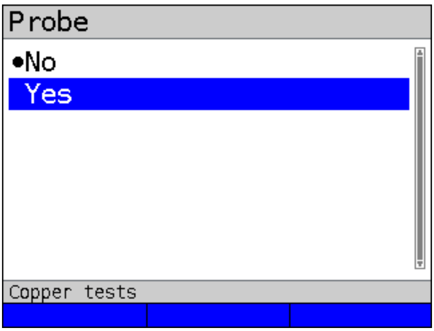
ARGUS displays the total power. The total power is the sum of all individual power measurements (Δf) over the entire visible range, in this example -299 dBm over 2.2 MHz.

<Menu>

or 5 Restores total power display

Probe (7):





The line scope is high-ohm.
Input impedance: 3.6 kΩ
Input capacitance: 30 pF

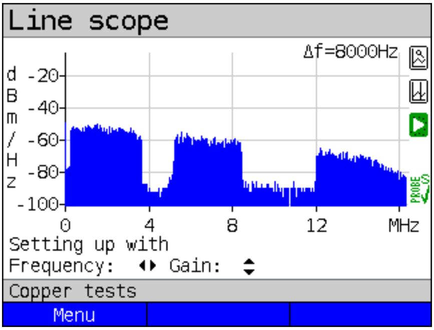
However, even with the line scope you may also need to use a high-ohm probe (ARGUS Active Probe).

ARGUS Active Probe II:
Input impedance: 70 kΩ
Input capacitance: 1 pF
Functions: Symmetry/asymmetry toggling

After connecting the probe, you can switch it on using this menu.

7 To activate the probe, see page 261.

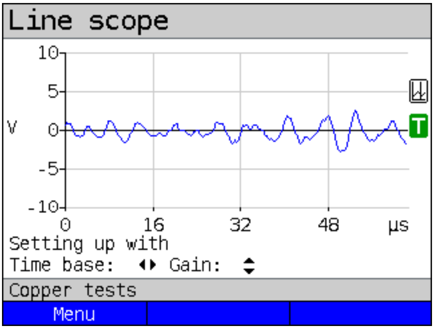
Symmetry (8):



Once the probe has been switched on and detected, you can switch between symmetric and asymmetric operation using Symmetry.
In asymmetric operation, the useful signal is hidden so that you see only noise and any interference sources (see example illustration).

 Symmetry/asymmetry toggling

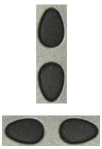
Time domain (9):



<Menu>

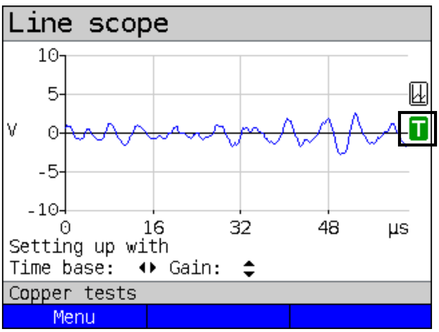
or  Opens time domain

In the line scope, you can switch from the frequency range to the time domain. In this respect, the line scope operates like an oscilloscope that permits display of AC voltages from 0 to 40 V_{pp} with a resolution of 2 mV_{pp}.
This makes it easy to recognize different AC voltage signals, e.g. the square-wave signal of an E1 access.



The gain and time base can be set using the horizontal and vertical cursor keys analogous to the frequency range.

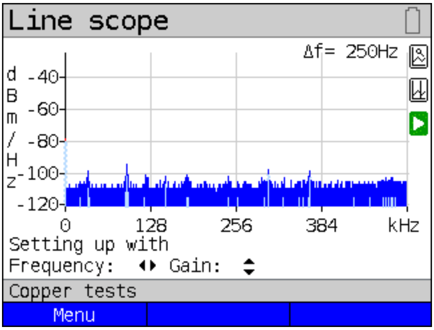
The cursor functions are also available in the time domain for analysing the signal. However, there is no zoom function.



If ARGUS detects that the connected signal regularly exceeds a certain threshold, ARGUS tries to trigger automatically in response to this so as to optimally display the signal in the time domain.

The trigger symbol is green.
If no signal is present or the level is too low, the trigger symbol is red. ARGUS does not trigger.

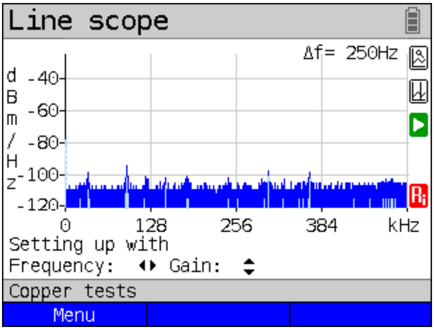
Peak hold (min/max) (0):



The peak-hold function can be additionally activated using the number key 0.

When the peak-hold function is used, positive (blue) and negative (yellow) peaks are shown graphically. The result is a blue curve of maxima and a yellow curve of minima over time. The instantaneous values continue to be displayed in red.
In the maximum values in particular, sporadic fliers (interference pulses) are visible and permit comparison between different lines (e.g. particularly clearly with the aid of a suitable clip-on ammeter).

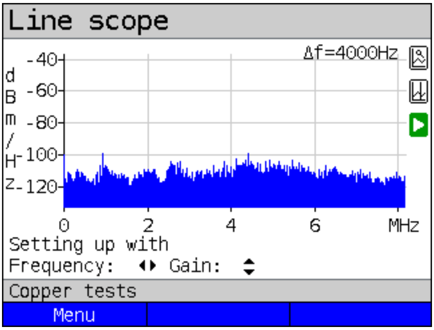
100 Ohm Input resistance (#):



Particularly when using a suitable clip-on ammeter, it may be necessary to adjust the input resistance of the line monitor (input impedance, see page 254). The red symbol Ri indicates that the line monitor is operating with an input resistance of 100 Ω..

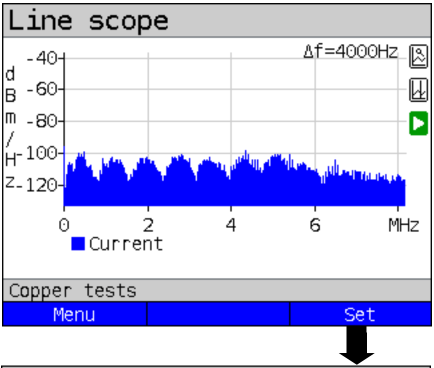
A suitable clip-on ammeter is available as an accessory for ARGUS; please ask our Support team.

Reference curve (*0):

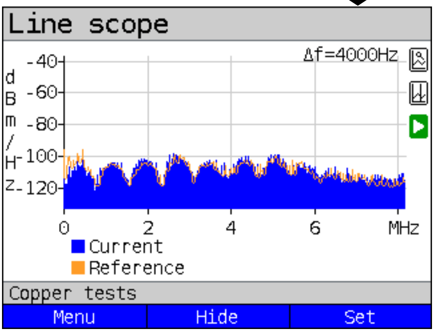


The reference curve enables e.g. comparison of the signal from one line with that from another.
To do this, start the line scope and connect it to line a. After obtaining the desired reference signal by setting the measuring range in the display, set the curve. Now switch to line b without closing the line monitor and compare the two signals.

<Menu> or  and  Restores reference curve function.



<Set> Set reference curve.

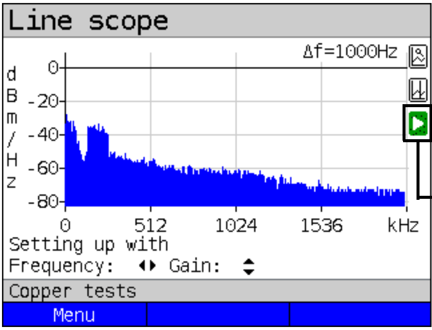


When the reference curve is set, an orange line is displayed in the graph.

<Hide> Hide reference curve.

<Set> Set a new reference curve.

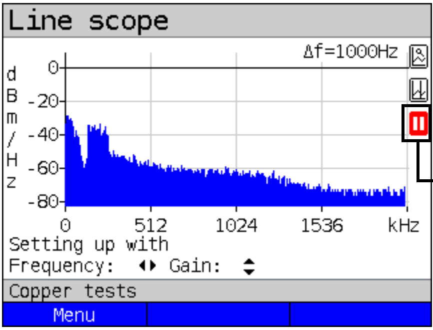
Run/Hold



You can stop and restart a running test (realtime mode) at any time.


Test running


Stop test

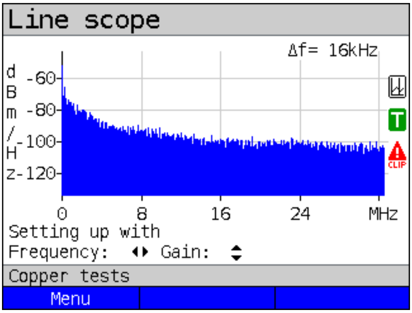



Test is stopped

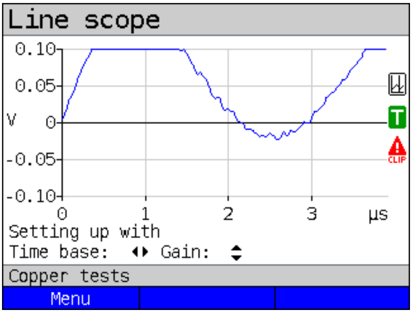

Restart test

Clipping:

Frequency range:



Time domain:



If the signal at the line scope input is too strong or the gain in the frequency range and time domain are displayed as too large, the input stage of the line scope is over-driven.

In this case, ARGUS displays the clipping symbol  .

The displayed signal is clipped both in the frequency range and the time domain. You can remedy this by reducing the gain.

Saving test results without terminating the line scope

You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 83.

See page 310 for the meanings of all symbols used in the line scope.

21.2 Active Probe

The ARGUS Active Probe is an active, high-impedance probe that can be passively patched into an existing connection without interfering with it.

⚠ In spite of the high impedance probe, it can cause transient losses of existing connections when it is patched in.

The ARGUS Active Probe II is designed to be used with the ARGUS line scope. The high-ohm line scope (input impedance 3.6 kΩ)) can also be used without the ARGUS Active Probe II (see page 252).

21.2.1 Active Probe II

The ARGUS Active Probe II has the following technical specifications:
- Input impedance: 70 kΩ
- Input capacitance: 1 pF
- Frequency range: 10 kHz to 30 MHz (± 1.5 dB)
- Attenuation, symmetrical 14.5 dB
- 2 x 4 mm banana plug sockets (spacing 12 mm)
- Data transmission to ARGUS via RJ45 lead (pins 4/5)
- Supply voltage: 5 V via ARGUS USB-host interface and USB cable

The Active Probe II can be operated in both symmetric and asymmetric mode. You can switch between these two operating modes using the hotkey 

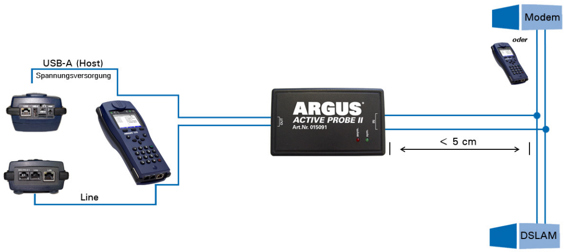
or via the menu. See page 255, line scope for an application example.

The Active Probe II:

21.2.2 Connecting the Active Probe II

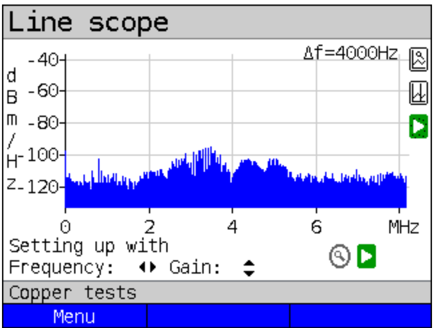
Connect ARGUS to the Active Probe II via the Line socket and the USB-A interface (host). ARGUS supplies the Active Probe with a voltage of 5 V via the USB host interface. Connect the Active Probe to the line to be tested (in this example Active Probe II between modem and DSLAM) using a lead that is as short as possible (< 5 cm).

Connection example:



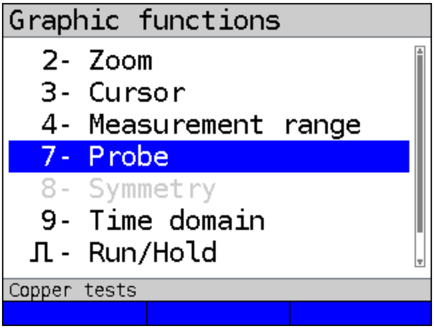
The connection cable and adapter supplied with the device have been designed to be as short as possible. The Active Probe II should be operated using leads that are as short as possible. To obtain optimum measurement results, it is important for the Active Probe to be connected in direct proximity to the line to be tested. Every extension of these connecting leads increases the input capacitance of the Active Probe, which can falsify the measurement results. Even the positions of the two leads in relation to each other can falsify the results as the lengths increase. When the Active Probe is used as supplied, ARGUS automatically subtracts the additional attenuation from the measurement results.

21.2.3 Starting Active Probe II (example with line scope)



After starting a test (in this example with Line scope), you can open the Probe menu using the graph functions or the number key 7.

Continued on next page

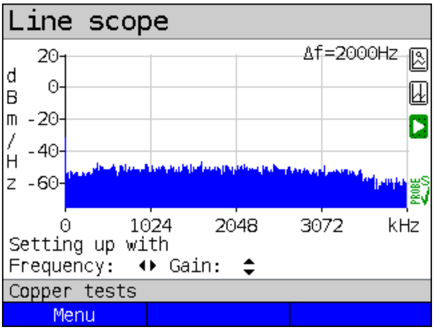


Opens the Probe menu directly.

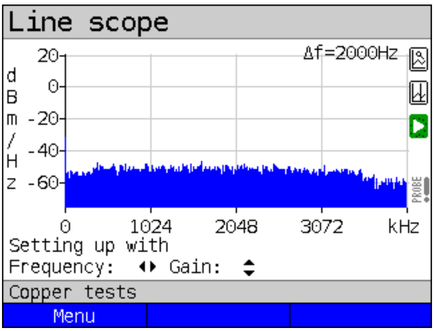
Select "yes" to use the probe.
ARGUS then switches on the supply voltage to the USB-A interface and automatically subtracts the additional damping caused by the Active Probe from the measuring results.

When the Active Probe is active and properly supplied from ARGUS, the green LED on the probe lights up.

Activation of the probe can take up to 10 seconds.

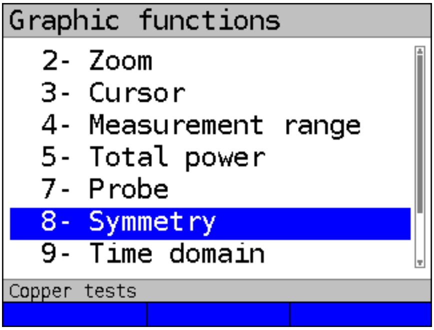


A green tick mark in the lower right of the display indicates during a test that the Active Probe is connected correctly.

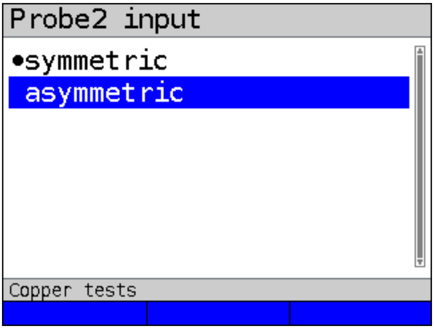


If the Active Probe is not connected correctly and thus not detected by ARGUS or intentionally deactivated via the Probe menu, ARGUS displays an exclamation point in the lower right of the display.

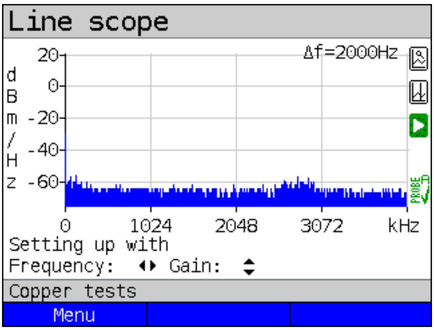
Toggling symmetry/asymmetry:



See the Line scope description on page 255 for an example for toggling symmetry/asymmetry.



Once the test is started and Active Probe II activated, you can toggle the probe input between symmetric and asymmetric operation using the number key .



When switched to asymmetric mode, ARGUS displays possible interference sources and the line noise. The usable signal is hidden.

Saving test results without terminating the Line scope

You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 83.

21.3 TDR

The TDR function enables you to determine line lengths in realtime or localise interference sources. Correct interpretation of the pulses displayed by ARGUS permits e.g. detection of stub lines, poor contacts or short-circuits. For this purpose, ARGUS transmits a pulse on the connected line and displays its reflection response.

The line may not carry a DC voltage greater than 200 V DC and must be free of AC voltage components.

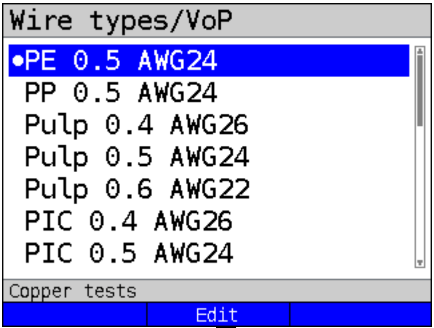
The result of a TDR measurement in the ARGUS display may give the impression of multiple interference sources on the line. It is recommended that you eliminate the first interference source on the line and then repeat your measurement. It is possible that the first interference source caused one or more reflections, which can greatly falsify the reflection at the second interference source. Often, there is no second interference source on the line.

ARGUS generates a reflection at approx. 3 m. To precisely measure short lines and avoid this reflection, using e.g. a 5 m long connection lead is recommended. The pulse continues to be displayed in the graph but using the cable ensures that this is not on the line.

21.3.1 TDR settings

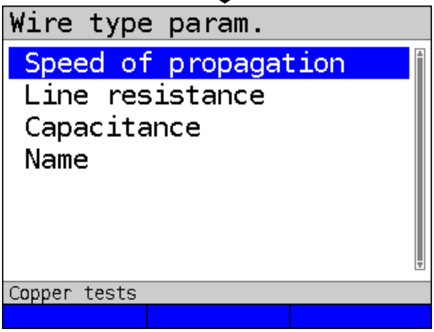
The chapter "Configuring accesses", page 30, explains how to set up the access type "Copper tests".

21.3.2 Wire types



Selects the wire types to be configured.

<Edit> Edits the wire-type parameters.



Setting	Description
Wire type/VoP	
Propagation speed	To determine the distance, the calculation must take into account a correction value dependent on the wire type that specifies the ratio of the pulse propagation speed in the cable to the speed of light in a vacuum (c_0 = 299.792458 m/µs). For many cable types, the pulse time is also specified in V/2. Minimum: 45.0 m/µs (VoP in %: 30) Maximum: 149.7 m/µs (VoP in %: 99.9) Default: ***98.9 m/µs (VoP in %: 66)*** The choice of propagation speed as VoP or V/2 is saved.
Line resistance	Sets the line resistance per kilometer. Range: 40 Ω/km to 400 Ω/km Default: ***80 Ω/km***

`Capacitance`	Sets the capacitance (operating (mutual) capacitance) per kilometer. Range: 35 nF/km to 100 nF/km Default: ***39 nF/km***
`Name`	Enter the name of the wire type. Default: ***PE 0.5 AWG24***

⚠ The configured cable types are also used for TDR measurement.

⚠ The default values only apply for this first cable type.

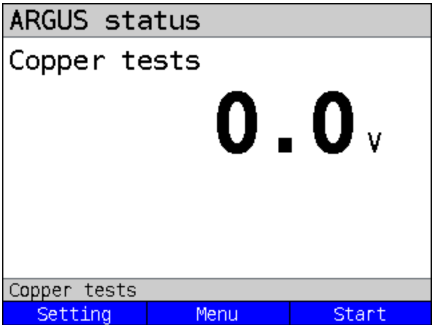
List of preconfigured default wire types:

No.	Name	Wire diameter (mm)	Line resistance (Ohm/km)	Mutual capaci-tance (nf/km)	VoP (%)	Note
1	PE 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, Poly-ethylene, air filled
2	PP 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, Poly-propylone, air filled
3	Pulp 0.4 AWG26	0.4	150	36	60.0	Outdoor cable, conductor with pulp jacket, air filled
4	Pulp 0.5 AWG24	0.5	80	39	67.0	Outdoor cable, conductor with pulp jacket, air filled
5	Pulp 0.6 AWG22	0.6	65	38	68.0	Outdoor cable, conductor with pulp jacket, air filled
6	PIC 0.4 AWG26	0.4	150	36	64.0	Outdoor cable, conductor with plastic jacket, air filled
7	PIC 0.5 AWG24	0.5	80	39	66.0	Outdoor cable, conductor with plastic jacket, air filled
8	PIC 0.6 AWG22	0.6	65	38	67.0	Outdoor cable, conductor with plastic jacket, air filled
9	PIC 0.9 AWG19	0.9	29	34	72.0	Outdoor cable, conductor with plastic jacket, air filled
10	Jelly 0.9 AWG19	0.9	29	34	68.0	Outdoor cable, petroleum/ jelly filled cable
11	Filled 0.4 AWG26	0.4	150	36	58.0	Outdoor cable, filled

No.	Name	Wire diameter (mm)	Line resistance (Ohm/km)	Mutual capaci-tance (nf/km)	VoP (%)	Note
12	Filled 0.5 AWG24	0.5	80	39	60.0	Outdoor cable, filled
13	Filled 0.6 AWG22	0.6	65	38	62.0	Outdoor cable, filled
14	PTFE/Teflon 0.5 AWG24	0.5	80	39	67.0	Outdoor cable, conductor with teflon jacket
15	Wire type 15	-	80	49	66.7	default, editable
16	Wire type 16	-	80	49	66.7	default, editable
17	Wire type 17	-	80	49	66.7	default, editable
18	Wire type 18	-	80	49	66.7	default, editable
19	Wire type 19	-	80	49	66.7	default, editable
20	Wire type 20	-	80	49	66.7	default, editable

21.3.3 Starting TDR

The chapter "Configuring accesses", page 30, explains how to set up the connection type "Copper tests".



ARGUS status display.
ARGUS indicates any DC voltage on the line.

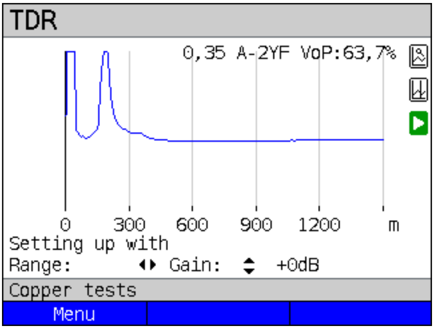
<Setting>	Switches to the settings for the wire-type list, see page 265.
<Menu>	Switches to main menu.
<Start>	Directly accesses "Single tests" menu.

TDR

Select and start TDR.

Continued on next page

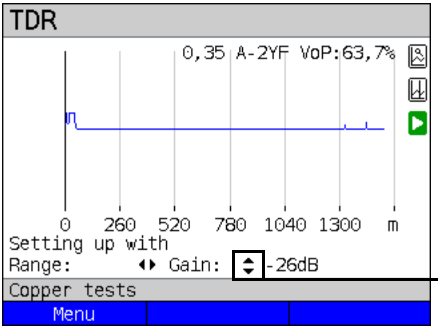
TDR status display:



ARGUS displays possible interference sources on the copper twisted pair directly.
In this example, after the input pulse (starting at 0 meters) we can see a second pulse that spikes at approx. 150 m. This can indicate a 150 m long line that is open at its end.

The adjustable range, the gain and the graph functions permit more detailed analysis.

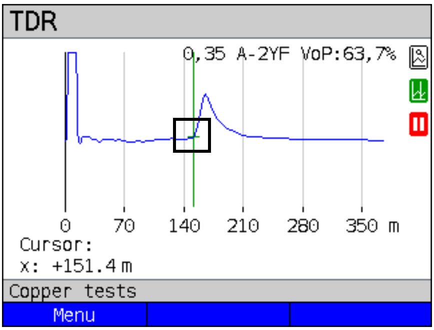
Gain:



To ensure optimum detection of pulse reflections, match the function for adjusting the gain (y-axis) with the reduction/ enlargement of the range shown (x-axis). ARGUS always starts with the lowest gain (-26 dB) at a range of 1500 meters.

Gain-Y: Sets the gain from -26 dB, -20 dB, 0 dB, +14 dB +24 dB, +34 dB, +44 dB

Range:

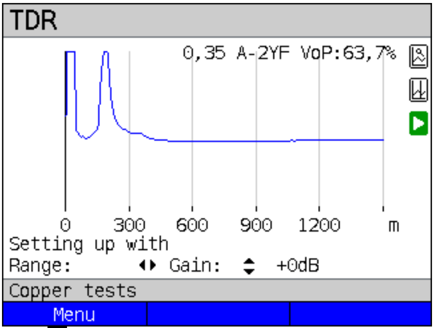


The measurements with the TDR can take place in a measuring range of from 3.5 to 6000 meters. The resolution is approx. 0.3 % of the displayed measuring range.

The accuracy is approx. ±2 % of the measuring range. When determining the distance, try to determine the start of a pulse where possible, and not the relative maximum.

Range-X: Sets the displayed measuring range. Every press of the cursor key halves or doubles the displayed range.

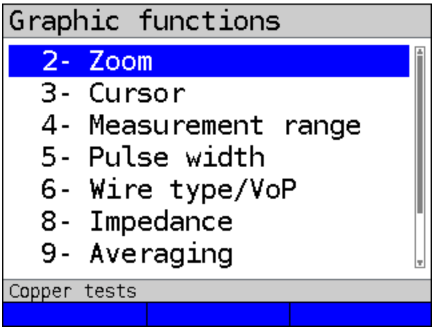
21.3.4 Graph functions



The graphic functions Zoom and Cursor enable detailed analyses of the graphs.

<Menu> Opens graph functions

Press in the status display (in the graph) to save the results and stop the TDR function.



The Graph functions menu opens.

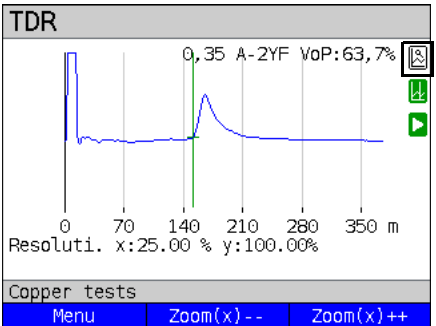
Exits the menu without changing.

You can also use this number key to activate the Zoom function within a graph.

The function of the cursor is described on page 270.

Accepts the selection and returns to the graph.

Zoom (2):



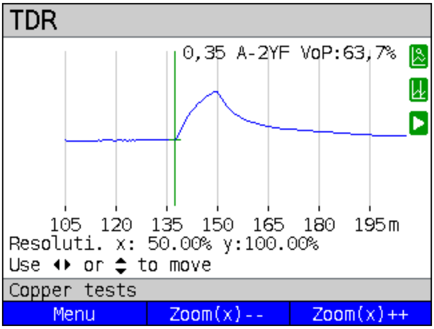
The magnifying glass shown in the display rests on a white background.
It has not yet been zoomed.
When the magnifier is placed over a dark background, the graph is zoomed.

<Zoom(x)++> Enlarges the middle section of the graph (100%).

<Zoom(x)--> Not yet zoomed! Reverses **<Zoom(x)++>** and resets magnification.

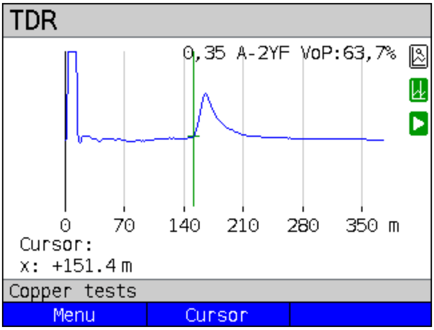
When zooming, the y-axis always remains at 100 %. No y-axis zoom is available.

Continued on next page



You can vary the graph size from 25 % to 100 % using the zoom softkeys. This doubles or halves the resolution.
When concurrently using the cursor, you can precisely localise the reflection on the measured line.

Cursor (3):



When the Cursor function is started, a green cursor line appears in the middle of the graph.

<Cursor> You can toggle the cursor on and off as needed using the Cursor softkey after activating it in the menu.

The values of the graph for the position under the cursor are displayed below the graph:

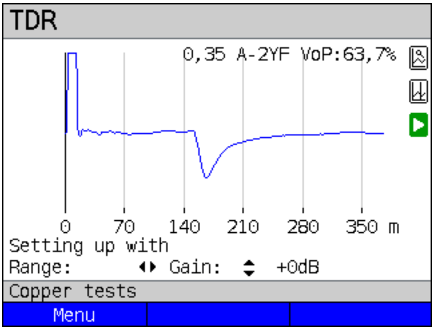
x: +151.4 m

⚠ When the Stop function (see page 273) is activated, you can move the cursor faster.

Use the left and right cursor keys to move the cursor to any position on the graph to measure it. Briefly pressing the cursor key causes the cursor to jump to a new position in the graph. When the cursor key is held down, the steps the cursor covers in the graph become progressively larger.

The Zoom function and the Cursor function can also be combined. For example, you can determine a certain value using the cursor more easily when you have previously zoomed in on a specific area. However, the starting position of the cursor can vary.

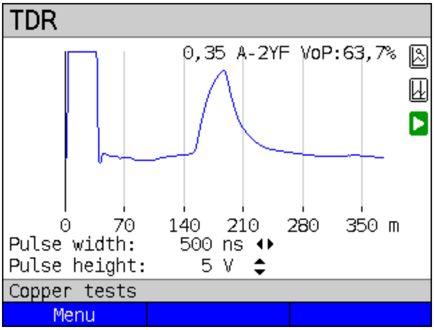
Measuring range (4):



When the TDR function starts, it is in the measuring range in the status display. You can set the range (x) and the gain (y) in the measuring range. If you have hidden the measuring range in order to work with the cursor or zoom, you can restore it:

<Menu>
or  Restores the measuring range

Pulse width/height (5):



You can configure the width and height of the pulse that ARGUS outputs to the line.

 Configuring the pulse

Height:
The pulse height sets the level of the pulse ARGUS outputs to the line in volts. The default value is ***5 V***, but can be increased to 20 V. In principle, it is recommended that you increase the pulse height as the distance increases.
On short, very noisy lines as well, increasing the pulse can make the reflection stand out better against the noise, for a more reliable interpretation.

Width:
The pulse width sets the duration of the pulse ARGUS outputs to the line in nanoseconds (ns). The default value is ***15 ns***, but you can increase this up to 60 ns depending on the measuring range. Just like a more powerful pulse, a longer pulse contains more energy, and thus is generally more suitable for use on longer lines. However, a longer pulse can also conceal important reflections, which can then no longer be correctly interpreted.

Wire types (6):

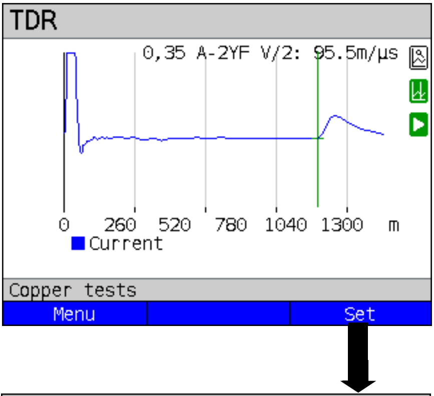
The absolute VoP value must always be less than 1. However, ARGUS always displays this in percent. In a wire with a VoP value of 0.7, a signal propagates at 70 % of the speed of light (c_0).

For many cable types, the pulse time is also specified in V/2: V/2 = VoP [%] * 1.5. In this example, the V/2 value would come to 95.5 m/µs for a VoP of 0.637 resp. 63.7 %.

A typical patch cable has e.g. a VoP of 0.667 resp. 66.7 %, which corresponds to a V/2 of exactly 100 m/µs.

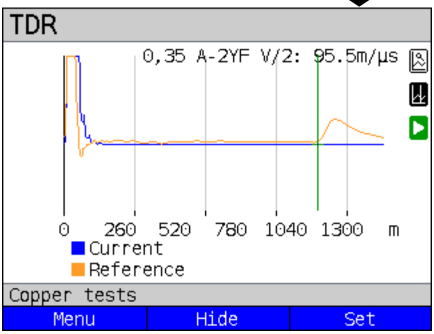
⚠ To measure e.g. building wiring precisely, it is important to set the correct VoP value. You can determine the correct VoP using a reference cable of known length before the measurement.

Reference curve (*0):



See also the instructions on page 257 on using the reference curve.

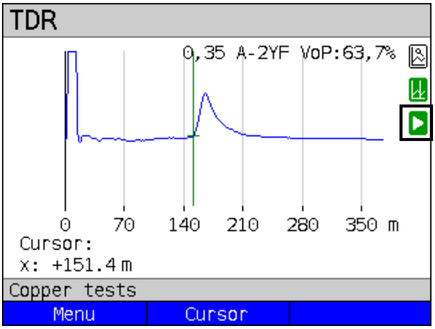
In this example, the line is open at 143.3 m (reference value).



When the reference curve is set, an orange line is displayed in the graph. In this example, the line is terminated.

<Hide>	Hide reference curve.
<Set>	Set a new reference curve.

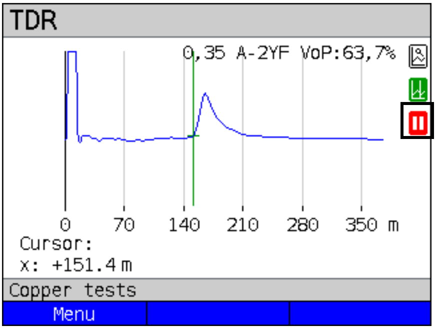
Start/stop:



You can stop and restart a running test (realtime mode) at any time.

 Test running

 Stop test



 Test is stopped

 Restart test

Saving test results without terminating the TDR

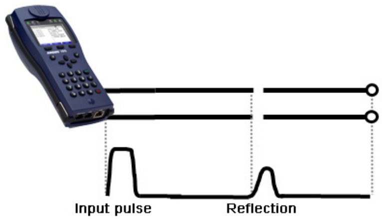
You can save your results of the measurement without disconnecting in the same way as for VDSL, see page 83.

⚠ See page 310 for the meanings of all symbols used in the TDR.

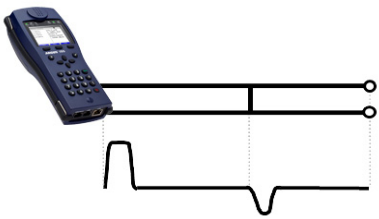
21.3.5 Examples

The following signal forms can help you in interpreting the reflection responses that ARGUS displays.

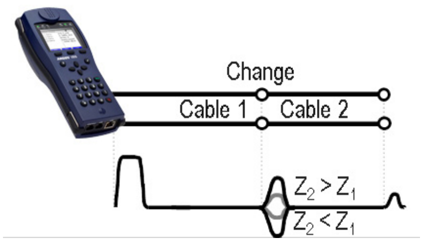
Examples:



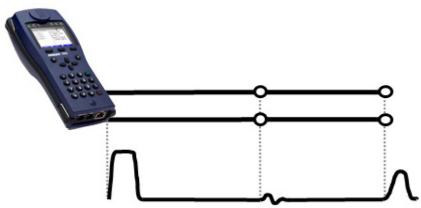
Open cable
The reflected pulse is positive. No proximate interference sources or the far end of the line can be seen.



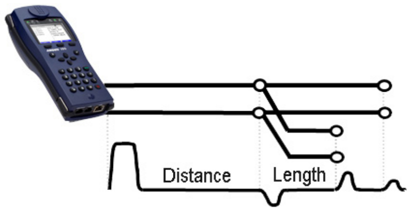
Short-circuit
The reflected pulse is negative. No proximate interference sources or the far end of the line can be seen.



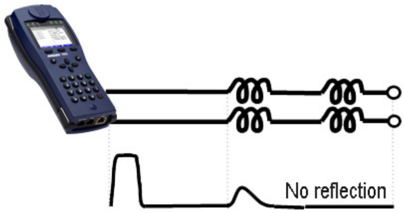
Mismatch
Different line cross-sections were used. The greater the mismatch, the greater the amplitude of the reflection.



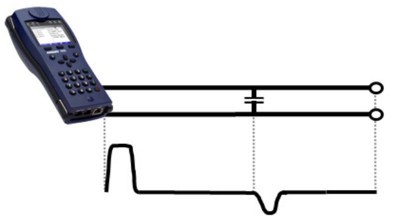
Poor contact point
A poor contact between two lines distorts the reflection into an S-shape. The worse the contact, the greater the reflection.



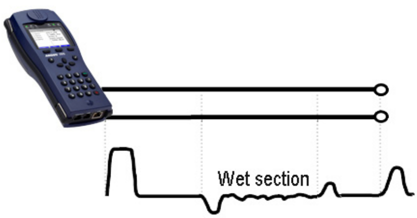
Stub line
The beginning of a stub line appears in the form of a negative reflection, followed by a positive reflection corresponding to the length of the stub line when the end of the stub line is open.



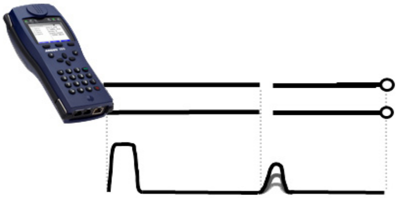
Loading coils
Loading coils deployed on the line are optimally designed for transmitting voice frequencies. They do not let DSL signals through. The TDR function enables you to detect the first coil in a line. The reflection is positive with a long tail in the direction of the end of the line. The following faults cannot be detected.



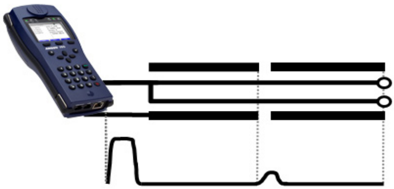
Capacitive network
Like a short-circuit, the reflection from a capacitive network is negative.



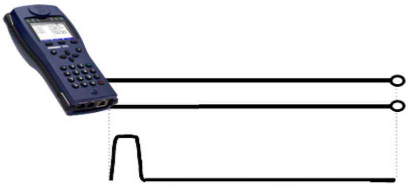
Moisture
Moisture penetrating the cable has the same effect on the reflection as a stub line. However, the zone between the negative and positive reflection appears significantly noisier than for a normal stub line.



Loose/intermittent contact
Realtime operation is extremely suitable for detecting intermittent contacts. The amplitude of the positive reflections varies depending on the intermittent contact frequency.



Open shielding
Broken or open cable shielding can be detected by connecting the “a“ and “b“ cores to ARGUS via one contact and the shielding to a second. The reflection looks like an open line.



Correct line termination
When the line is properly and correctly terminated, the pulse generated by ARGUS is completely absorbed. No further reflections are visible.

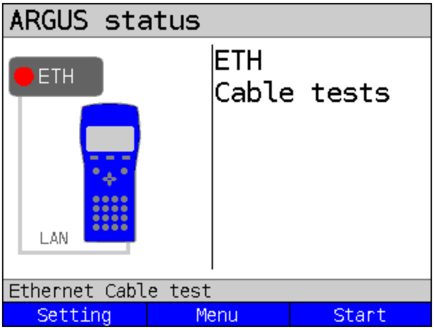
22 Ethernet cable tests

⚠ For performing the following tests, the line must be voltage-free.

22.1 Configuring the Ethernet interface

Connect the local loop to the ARGUS socket "LAN" and switch on ARGUS. The chapter "Configuring the local loop", page 30, explains how to set up the connection type "Ethernet Cable Test".

Status screen



Test not yet started:
red LED in display!

Meaning of LED image in display:

Red LED: no test started

`<Setting>`	Opens the Ethernet cable test setup, see below.
`<Menu>`	Switches to main menu.
`<Start>`	Starts the Ethernet cable test, see below.

22.2 Ethernet cable test settings

You can configure the following "Ethernet parameters". You can restore the default settings at any time (see page 314). The following example is used to illustrate how to modify a parameter.

Settings

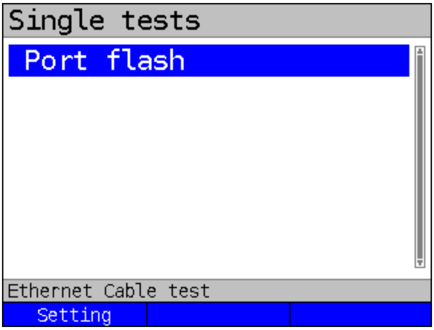
↓ ✓

Copper/cable tests

↓ ✓

ETH cable tests

↓ ✓



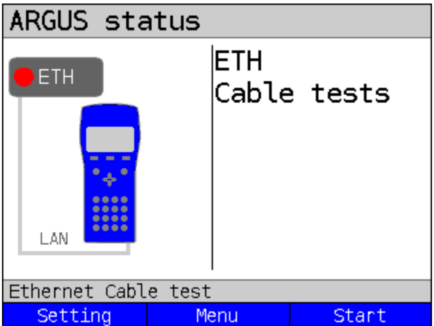
Select Port flash.

ETH port flash
Interval that ARGUS keeps the port active before performing a link disconnect. The disconnect time depends on the switch. Range: 1 - 5 seconds Default: ***1 s***

22.3 Ethernet port flash

ARGUS can identify the port currently in use on the Ethernet switch using the test "Ethernet port flash". To facilitate identification, the flash frequency at the switch can be set in ARGUS.

22.3.1 Starting Ethernet port flash



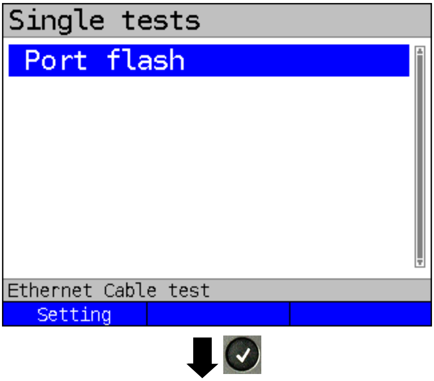
ARGUS in the status line.

`<Setting>` Opens the Ethernet cable test settings, see page 277.

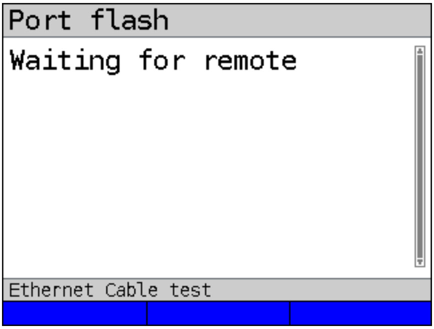
`<Menu>` Opens the main menu.

`<Start>` Starts Ethernet cable test.

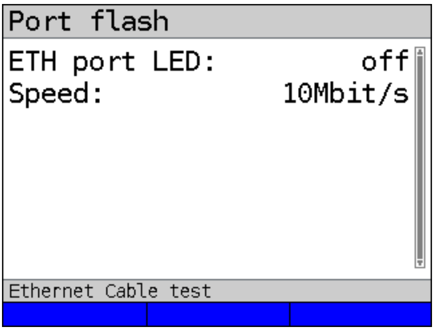
Continued on next page



Start port flash directly by selecting it.



The Ethernet port flash test is executed.



The test "ETH port flash" has been executed.

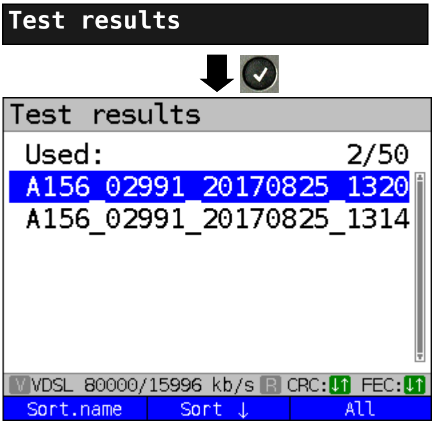
Display:

- Indication whether the port LED is flashing (in example "off").
- Link speed attained.

23 Test results

The saved test data are displayed either in the ARGUS display or on the PC. You can transfer the results to the PC, where the software WINplus / WINanalyse generates a detailed measurement log (along with other functions).

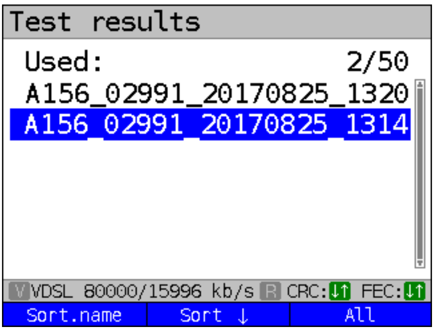
ARGUS stores the test results together in 50 definable save slots. The system suggests "New result" as the default save name. The saved test results are also deleted when all configuration settings are reset.
The functions ("View", "Rename", "Send to PC", "Delete") in the Test results menu refer to one test result. You must thus first select a save slot with a test result:



ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

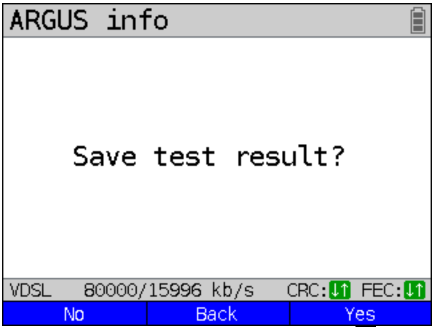
ARGUS displays the name of the stored result and the number of occupied slots.

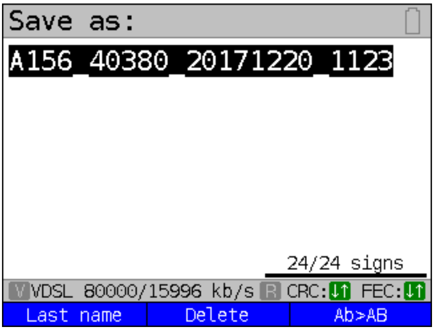


When multiple test results are saved, ARGUS lets you sort them by name and time (as in this example). You can also sort them manually.

`<Sort time>`	Sorts test results by time.
`<Sort ↑>`	The marked test result is moved up one place in the list.
`<Sort ↓>`	The marked test result is moved down one place in the list.
`<All>`	Deletes all test results or send to PC.

23.1 Saving test results





Save result

You can save the result after the end of a test or after disconnecting a connection.

ARGUS saves the test result in the first free slot. If all slots are occupied, you need to manually select a slot to overwrite.

ARGUS automatically proposes a save name. The name is composed of:
- the device type (in this example A156)
- the serial number (in this example 40380)
- the configured date (in this example 20th december 2017)
-the adjusted time (in this example 11:23 h)

You can accept the displayed save name or enter a new one using the number keys. The right softkey changes its meaning when pressed, affecting your entry. You can enter up to 24 characters. ARGUS displays the number of characters used so far.

`<Last name>`	ARGUS suggests the last save name used.
`<Ab>AB>`	Entry begins with upper-case letters and continues in lower-case.
`<AB>12>`	Entry of upper-case letters.
`<12>ab>`	Numerical entry.
`<ab>AB>`	Entry of lower-case letters.
	Entry of special characters, e.g. @, /, -, ., *, ?, %, =, &, ! etc.
	Entry of special characters e.g. _, :, +, # etc.
`<Delete>`	Deletes the place in front of the cursor.
	Moves cursor
	Don't save result, return to previous display.

23.2 Displaying saved test results

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Test results

New result

Select a save slot (in this example selection of the first slot with the save name "New result").

View

Display of test result

23.3 Sending test results to a PC

You can send the test results to a PC for viewing and archiving. Connect ARGUS (ARGUS socket "USB-B") to the interface of your PC using the cable supplied with the device and start the software WINplus or WINanalyse.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Test results

New result

Select a save slot (in this example selection of the first slot with the save name "New result").
All test results are transmitted.

Send test results to PC

Start data transmission to PC

23.4 Delete test results

Test results

New result

Delete

The test result is deleted.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Select a save slot (in this example selection of the first slot with the save name "New result").

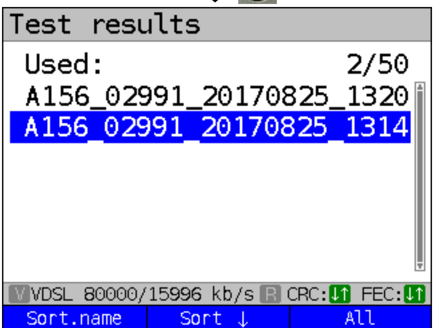
Deletes the test result stored in the selected slot.

To deletes all test results, see on page 305 “Restoring the factory settings”.

23.5 Sending all test results to PC

ARGUS transfers all saved test results to the connected PC. Connect ARGUS to the PC and start ARGUS WINplus or WINanalyse.

Test results



Send to PC

Start data transmission to PC

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

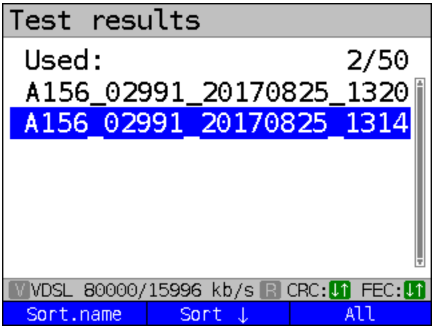
23.6 Deleting all test results

ARGUS deletes all saved test results from its internal memory.

ARGUS in Main Menu

Test results

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .



Delete

Confirm the security prompt with <Yes>; all 50 possible test results are deleted.

24 WLAN

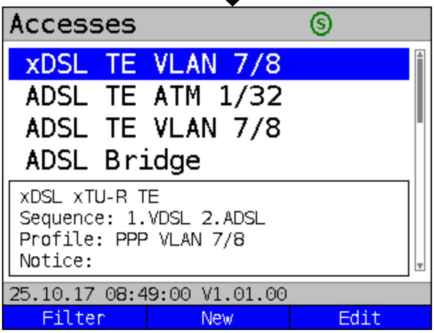
ARGUS can be WLAN-enabled using a USB WLAN stick. ARGUS then offers WLAN as the management interface for an array of functions. ARGUS supports a variety of approved WLAN sticks, which are available as accessories. Please ask our Support team.

⚠ You only need the WLAN kit (or the ARGUS USB mini-hub) if your ARGUS only has one USB host interface and you wish to connect two USB devices (e.g. WLAN + ARGUS Copper Box).

⚠ Always insert your USB devices in the hub first before you power up ARGUS.

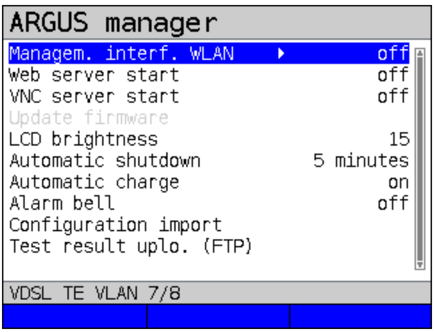
24.1 Starting WLAN


Switch on ARGUS



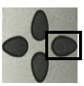
Access list or any point in the menu.

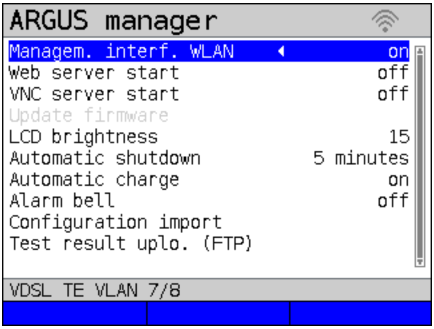

press shortly



ARGUS manager display

- M-interface ETH / WLAN, see page 298
- Web server start, see page 300
- VNC server start, see page 300
- Update firmware, see page 291
- LCD brightness, see page 301
- Automatic shutdown, see page 302
- Auto. charge, see page 309
- Alarm bell, see page 302
- Configuration import, see page 293
- Test result upload (FTP), see page 296


right



You can activate/deactivate or change settings using the cursor key  .

The WLAN interface is now activated.

See page 298 for WLAN settings such as SSID, password, channel, etc.

Either ETH or WLAN can be selected as the management interface; the default setting is WLAN. You can change this under “Device settings/Management interface/Interface” (see page 298). This is only possible when the management interface is grayed out under “Start/Management interface”; if WLAN or Interface is grayed out, switch off the management interface first.

The WLAN interface is now activated. ARGUS is now in access-point mode (ARGUS-AP).

The WLAN symbol in the status line is green  .

You can set up a WLAN connection with ARGUS by selecting the WLAN access with the name Argus156_SerialNumber on a smart phone, tablet or laptop and entering the password stored in ARGUS.

Electronic job management applications can also access ARGUS and pick up measurements using WLAN.

24.2 Test results via WLAN

If for example a laptop has a working WLAN connection with ARGUS, you can open the Web server by entering the IP address of the ARGUS unit (see page 299) or myargus.info in your browser's address bar.

The test results with the name data.csv can be opened directly or saved on the laptop. You can also use this functionality to save, delete and rename measurement logs. For this, you require a WebDAV application/app on your PC/laptop or smart phone/tablet.

The .csv file contains the connection parameters of the last measurement conducted.

The command "VNC" lets you control ARGUS remotely via your browser.

You may first need to activate the VNC server on ARGUS, see page 300.

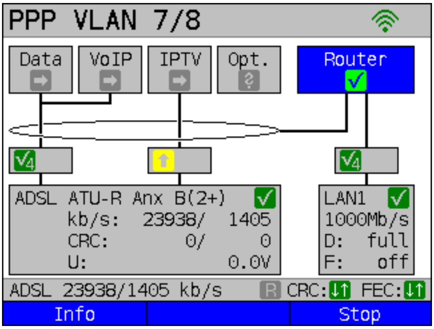
Further information regarding the VNC server is available on request.

The ARGUS Web server has its own SSL certificate (myargus.info), which permits https:// access.

You can also access ARGUS using WebDAV via myargus.info. By this means, you can download measurement logs in .amp format directly from ARGUS via Ethernet or WLAN.

24.3 WLAN in router mode

When the ARGUS WLAN interface is active, it is always connected directly with the ARGUS router. If you want to use ARGUS as a true WLAN access point (ARGUS-AP) and e.g. start a download with this device as the gateway, you must first start a DSL access (ADSL, VDSL, see page 57).



If the router (see diagram) has been started, both WLAN and LAN are connected to the ARGUS router.

The smartphone, tablet or laptop can use ARGUS as an access point. All applications such as data, VoIP or video that can be run e.g. on a smart phone can now be executed to test the connecting devices via ARGUS - thus replacing all customer devices.

WLAN and LAN are not linked via an Ethernet bridge. Each requires its own configuration. They may not be configured identically. A test from WLAN to LAN or vice-versa is not possible.

25 ARGUS settings

ARGUS can be custom-configured for special requirements. The default values are restored using "Reset" (see page 305).

25.1 Cloud services

ARGUS supports cloud services for communicating with its environment. These services enable ARGUS to share data with other systems via its test interface. ARGUS offers test interfaces for ADSL, VDSL, G.fast, SHDSL, Ethernet and LTE. When connected via these interfaces and with the data service running, ARGUS can download firmware updates, import a configuration and upload measurement logs.

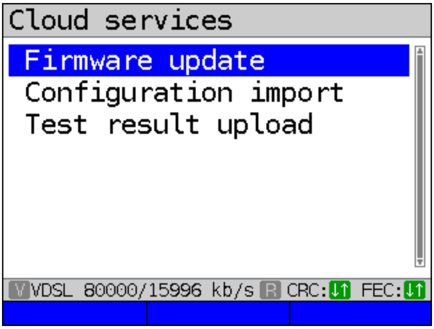
⚠ The cloud services are deactivated by default.

⚠ At a minimum, the data service must be connected and successfully started via a VL using the corresponding test interface.

⚠ ARGUS always loads the country variant last used by that instrument.

⚠ The instrument only checks whether there is a different firmware on the server than the one it has loaded. Be aware of this if you have your own update server. Downgrades are possible, and can result in a loss of configuration data.

Settings	ARGUS in Main Menu.
⬇ ✓	
Cloud services	Select cloud services.
⬇ ✓ Continued on next page	



Select the cloud service to configure, e. g. Firmware update.

Settings	Description
`Firmware update:`	
`Server`	Configuration of the server, s. page 288.
`Update check`	Defines whether to automatically check for a firmware update. Default: ***off***
`Update`	Starts the firmware update.
`Configuration import:`	
`Server`	Configuration of the server, s. page 290.
`Check`	Defines whether to check automatically for a new suitable configuration file. Default: ***off***
`Import destination`	Determines whether the current settings or the current and saved settings are to be imported. Default: ***Cur. & backed up config.***
`Import`	Starts the configuration import.
`Test result upload, server configuration, see page 296`	

Three server profiles are offered for server selection. All three profiles are identical, and differ only in their names:
- Server profile 1: Firmware
- Server profile 2: Configuration
- Server profile 3: Measurement log

You can also assign any name to the server profiles (Profile name) for your use, e.g. you can create two different profiles for importing configurations if measurement log uploading is not needed.

Only the server profile “Firmware” is preconfigured. When the server specified in this profile is used, ARGUS looks for a new firmware version on intec’s server. The ARGUS instrument logs onto the server with its serial number and IP address.

25.1.1 Cloud services settings

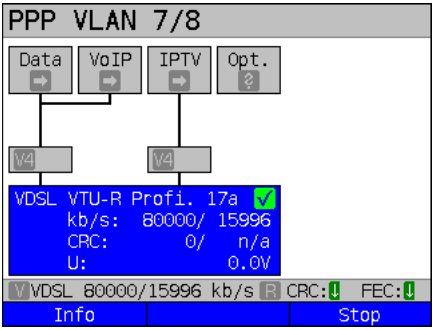
Settings	Description		
Firmware	<Edit> Activates the server profile you wish to edit.		
	Server	FTP server address	Entry the FTP server address. Default: ***firmware.argus.info***
		User name	Entry the user name. Default: ***argus***
		Password	Entry the password. Default: ***update***
		Profile name	Entry the profile name. Default: ***Firmware***
	Update check	Defines whether to automatically check for a firmware update. Default: ***off***	
Configuration	<Edit> Activates the server profile you wish to edit.		
	Server	FTP server address	Entry the FTP server address. Default: */*
		User name	Entry the user name. Default: */*
		Password	Entry the password. Default: */*
		Profile name	Entry the profile name. Default: ***Configuration***
	Check	Defines whether to automatically check for a new suitable configuration file. Default: ***off***	
Test result	<Edit> Activates the server profile you wish to edit.		
	Server	FTP server address	Default Default: */*
		User name	Entry the user name. Default: */*
		Password	Entry the password. Default: */*
		Profile name	Entry the profile name. Default: ***Test result***

See page 310 for the meanings of all symbols used for cloud update.

25.1.2 Cloud Update

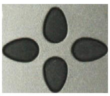
The cloud update process is explained in the following. In this example, VDSL VTU-R mode is configured and selected as described in chapter „5 Configuring accesses“ (see page 25). For details on configuring the firmware updates, see the chapter “Configuring ARGUS” on page 288.

⚠ Never under any circumstances import a configuration when ARGUS when is operating in battery mode. Connect ARGUS to the power adapter before importing a configuration.



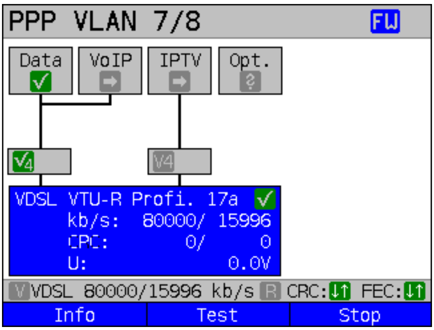
Starts the service.

The profile shown in the display (in this example profile 17a) is used for the cloud update.



Switch to Data using the cursor keys Data and press `<Start>` to activate the service.

If no connection is established, ARGUS automatically connects at this point using the default profile, s. page 57.



The service Data and the VDSL connection are active.

`<Info>`	Duration of activation.
`<Test>`	Opens test selection.
`<Stopp>`	Deacivates the service.

The blue “FW” in the status line indicates that a firmware update is available.

Continued on next page

Press one after another

 and 

Starts the firmware update

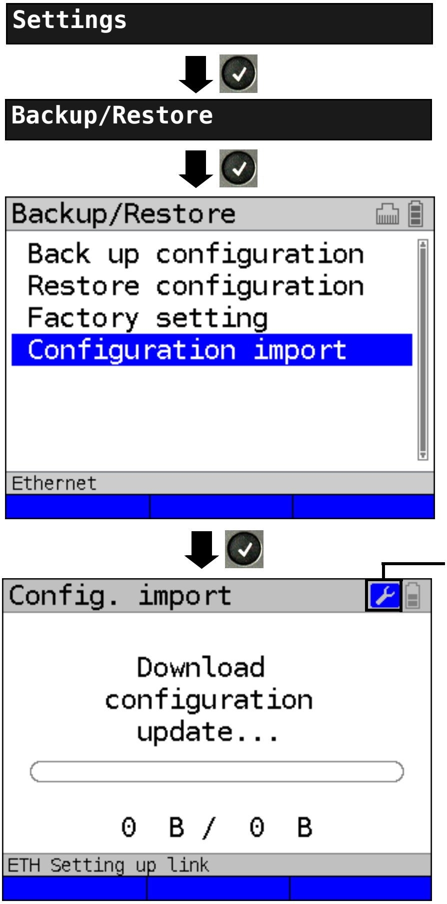
ARGUS automatically restarts after a successful firmware update.

25.1.3 Configuration import

25.1.3.1 Automatic configuration import

This function enables you to read out and adopt the ARGUS configuration file.

⚠ Never under any circumstances import a configuration when ARGUS when is operating in battery mode. Connect ARGUS to the power adapter before importing a configuration.



Prerequisites:

The instrument is connected to the interface (xDSL, G.fast, Ethernet or LTE).

The instrument must connect with the server, and a suitable configuration file for this instrument must be available. If this prerequisite is not met, you can only import a configuration manually.

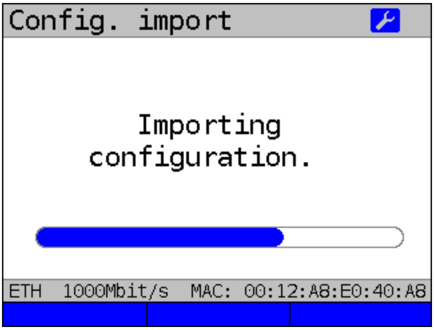
If the configuration is not imported immediately, the instrument will display a corresponding message each time the instrument is powered up.

Select “Configuration import”.

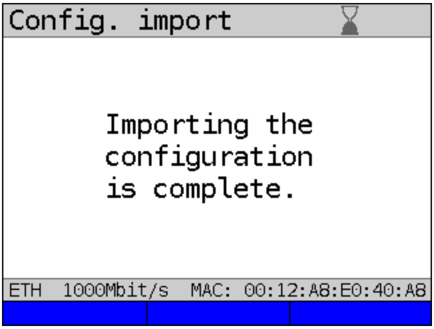
A new configuration is available.

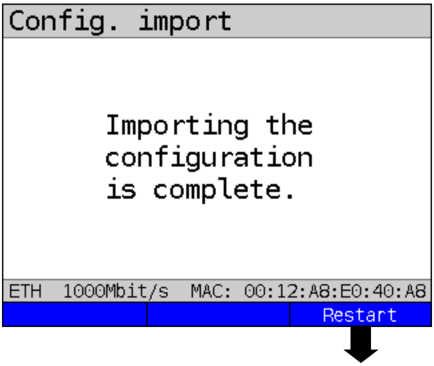
The configuration file is downloaded.

Continued on
next page



The configuration is imported.





⚠ The instrument needs a few seconds before it can be restarted; this is indicated by an hourglass in the top right next to the battery indicator.

`<Restart>` Restart of the device.

Once the import is successfully completed, restart the device.

25.1.3.2 Manual configuration import

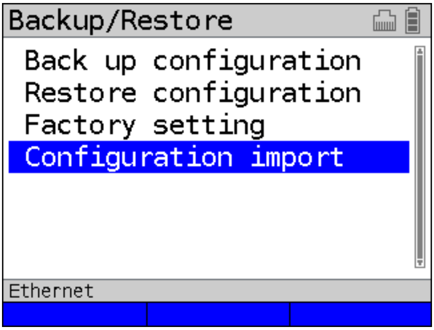
This function makes it possible to accept a configuration previously stored on the ARGUS instrument via WebDAV.

Never under any circumstances import a configuration when ARGUS is operating in battery mode. Connect ARGUS to the power adapter before importing a configuration.

Manual configuration import assumes that automatic configuration import is switched off, s. page 296.

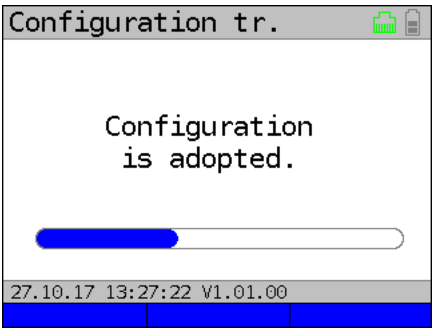
Settings

Backup / Restore



Select "Configuration import".

The configuration is read and loaded from an ARGUS configuration file (*.acn) stored on ARGUS in the folder "acn".



Once a WLAN link is active and a WebDAV server has transferred an acn file to ARGUS, you can load it. Otherwise "Adopt configuration" is grayed out. If ARGUS cannot find a suitable acn file, it outputs an error message.

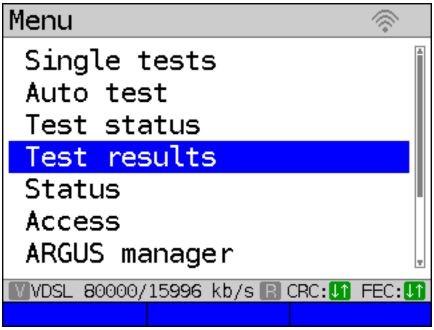
A configuration is imported.

Once the import is successfully completed, restart the device.

The instrument needs a few seconds before it can be restarted; this is indicated by an hourglass in the top right next to the battery indicator.

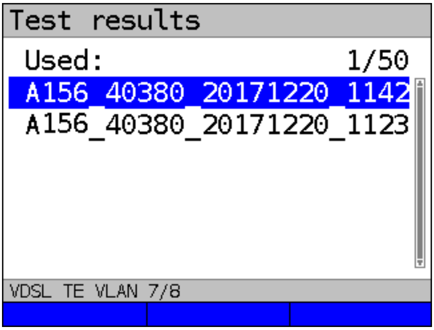
25.1.4 Upload test result

This function enables you to upload test results to an external server and download them again at a later date.



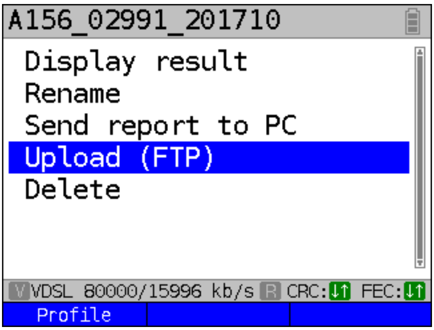
Prerequisites:

The instrument is connected to the interface (G.fast, xDSL, Ethernet or LTE).



The name of the test result “New result” can vary; you can also assign any name to the test results when saving.

`<Sort time>`	Sorts test results by time.
`<Sort ↑>`	The marked test result is moved up one place in the list.
`<Sort ↓>`	The marked test result is moved down one place in the list.
`<All>`	Deletes all test results or send to PC.

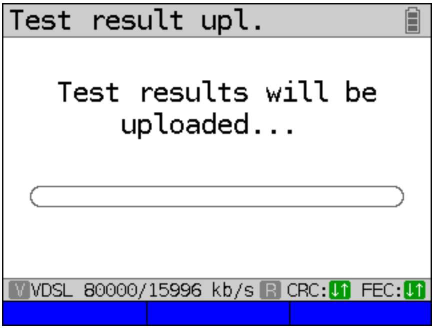


Select „Upload (FTP)“.

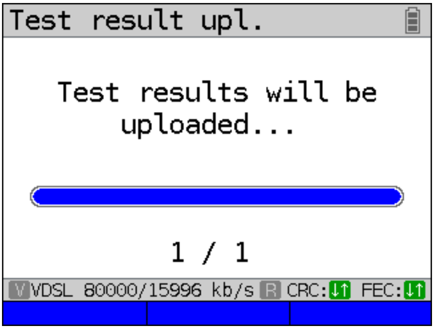
If there is no connection to the server, the instrument connects to the server when you start the upload.

`<Profile>`	If the server data are not stored, you can enter them here.

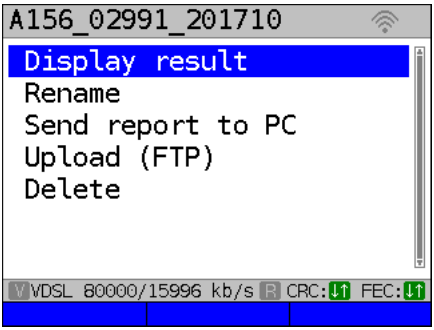
Continued on next page



The tests results are uploaded.



The upload takes a few seconds; the actual duration depends on the quantity and file size.



Following the upload, ARGUS returns to test results processing mode.

The upload is now complete, and the measurement result is on both the external server and ARGUS. It can now be deleted.

25.2 Remote access

ARGUS offers a wide variety of remote control functions. For instance, it can connect to a mobile end-user device (smart phone or tablet) via the WLAN interface, and can be remotely controlled from the mobile device.

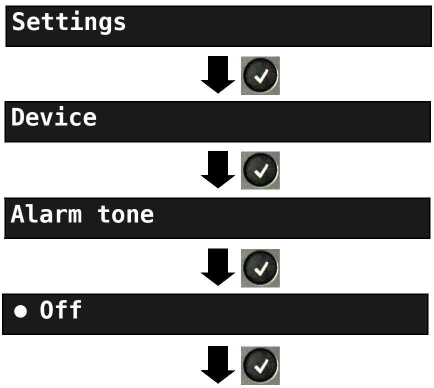
Settings	Description	
`Management interface`	Start management interface	Determines whether the management interface is used. If WLAN was selected as the management interface, ARGUS operates as a WLAN router, see below. Depending on the selected interface, ARGUS displays either a WLAN or an Ethernet symbol. WLAN: WLAN is not active (grey) WLAN is active (green) Ethernet: Ethernet is selected Default: ***off***
	Interface selection	When the interface selection is greyed out, the management interface must first be halted (see above) by setting „Start management interface" to off. Then restart it again. Selects the management interface (Ethernet or WLAN). Default: ***WLAN***
	WLAN	If WLAN is greyed out, the management interface must first be halted (see above) by setting „Start management interface" to off. Then restart it again.
		SSID: The service set identifier (SSID) is a user-definable name with which ARGUS can be identified as a network. Your SSID can also be displayed using the keyboard shortcut and . Default: ***Argus156_SerialNumber***

		Password	If WLAN was selected as the management interface (see page 298), mobile devices log in using a password query. The password (default: ***argus156****)* can also be displayed using the keyboard short-cut  and  .
		Channel	Selects the WLAN channel on which the WLAN stick transmits. Channels 1 through 11 are available for the 2.4 GHz frequency band, and channels 52, 56, 60 and 64 can be used for the 5 GHz band. Default: ***1***
		DHCP server	Settings for the DHCP server: - Starting and ending IP address Range: 0.0.0.0 to 255.255.255.255 Default: (assignment see RFC 3330) Start: ***192.168.20.30*** End: ***192.168.20.40*** - Domain name, see „User name“ page 109 for results - Duration of reservation for IP addresses Range: 1 to 99999 seconds Default: ***240***
	IP settings	IP address	ARGUS IP address Range: 0.0.0.0 to 255.255.255.255 Default: ***192.168.20.1*** (for issuing see RFC 3330)
		Netmask	IP netmask Range: 0.0.0.0 to 255.255.255.255 Default: ***255.255.255.0*** (for issuing see RFC 3330)
		Gateway	Gateway IP address Range: 0.0.0.0 to 255.255.255.255 Default: ***0.0.0.0*** (for issuing see RFC 3330)

`Webserver`	Start Webserver	Determines whether the webserver is used. Default: ***off***
	Password protection	Determines whether a password protection is used for the webserver. Default: ***on***
`VNC server`	Start VNC	Determines whether the VNC server is used. Default: ***off***
	Password protection	Determines whether the password protection is used. Default: ***on***
	VNC scaling	Determines the scaling used to display the ARGUS screen on the PC. Range: Factor 1 - Factor 4 Default: ***Factor 2***

25.3 Configuring the device

Changing a device setting is described using the setting "Alarm tone" as an example.



ARGUS adopts the marked setting as the default.

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Select a setting (e.g. Alarm tone) using the cursor keys.

The default is indicated with a ● in the display.

Mark the desired setting. The marked setting is highlighted in blue in the display.

Return to next-higher level menu without saving setting change.

Setting	Description	
Menu language	Select the operating language Default: ***depends on country***	
LCD brightness	Sets display contrast: 16 contrast levels are possible. You can increase or decrease the contrast using the cursor keys. The vertical arrow shows where the current contrast lies in the range from low to high contrast.	
Date / time setting	Enter the date, time, time offset and daylight savings time via the number keys. Switch between the lines using the up and down cursor keys. Change the three following settings, from top to bottom, so that all settings take effect:	
	Time offset:	Set the time offset (coordinated world time: UTC-12 to UTC+14) for your time zone here. UTC+1 is the setting for central Europe.
	Daylight savings time:	If central European time is selected, ARGUS calculates with a total time offset of UTC +2 during the summer months.
	Date / time:	To set the time manually, enter the correct time in your time zone using the ARGUS number keys. In automatic time setting, ARGUS automatically reads the time from a preconfigured time server. Default: ***0.de.pool.ntp.org*** This can be changed to a different server. The prerequisite is that ARGUS can connect to the internet. Carry out e.g. a ping test (e.g. ping www.argus.info).
	The time you enter runs on the built-in ARGUS realtime clock until the power supply is interrupted. When ARGUS is switched off and the batteries removed, the clock continues to run for a few days on its internal buffer. The time is undefined as soon as the buffer is exhausted, and must be set again.	
Ring volume	You can set the volume of the ring tone ARGUS uses to signal an incoming call. For one thing, you can adjust the initial volume. - Default: ***Level 1*** (very quiet) You can also adjust the end volume. - Default: ***Level 7*** (very loud) For an incoming call, ARGUS begins with the initial volume (very quiet) and increases the volume with each ring until it reaches the final volume level (very loud).	

<table>
<tr><td rowspan="5">Alarm tone</td><td colspan="2">ARGUS generates alarm tones in different situations, e.g. as soon as a bit error occurs in BERT or ARGUS has synchronised with an xDSL access, and when error counters reach high counts.</td></tr>
<tr><td>Short - long</td><td>Successfully synchronised</td></tr>
<tr><td>Long - short</td><td>Lost synchronisation</td></tr>
<tr><td>Short - short</td><td>Error counter spike (the tone relates only to the last second. Only one tone sounds even when multiple errors are displayed.)</td></tr>
<tr><td colspan="2">The setting "off" suppresses all alarm tones.
Default: off</td></tr>
<tr><td>Jingle</td><td colspan="2">An ARGUS jingle is played after the device powers up and initialises.
Default: off</td></tr>
<tr><td>Power management</td><td colspan="2">Automatic off: Sets the no-activity period after which ARGUS switches to power-saving mode when the power supply is not connected. When power-saving mode is turned off entirely, ARGUS will display a warning that switching off power-saving mode reduces the battery time the next time it is powered up. You can deactivate this warning with the "X" key. <On> cancels deactivation.
Default: after five minutes

Ilumination Sets the duration for background illumination. Background illumination is always on when the power supply adapter is connected. In battery mode, ARGUS switches off background illumination after a set time.
Default: after 30 seconds</td></tr>
<tr><td>Software option</td><td colspan="2">Activates a software option. You must enter an activation key via the keypad. A variety of options can be activated in ARGUS; each one requires entry of a 20-digit code via the number keys.This code will be provided on request.

There are also codes for resetting options. You should only enter these codes when you understand what they do.</td></tr>
<tr><td>Licenses</td><td colspan="2">Displays the open source packages, which are used in the ARGUS firmware and have been published under different licenses (GPL, LGPL, MIT, BSD, etc.), see page 326.</td></tr>
<tr><td colspan="3">Company address</td></tr>
<tr><td colspan="3">Entry of the customer address for the measurement log. Each configuration item permits up to 29 characters.
Company name — Default: */*
Street — Default: */*
ZIP/City — Default: */*
Phone number — Default: */*</td></tr>
</table>

25.4 Backing up and restoring settings

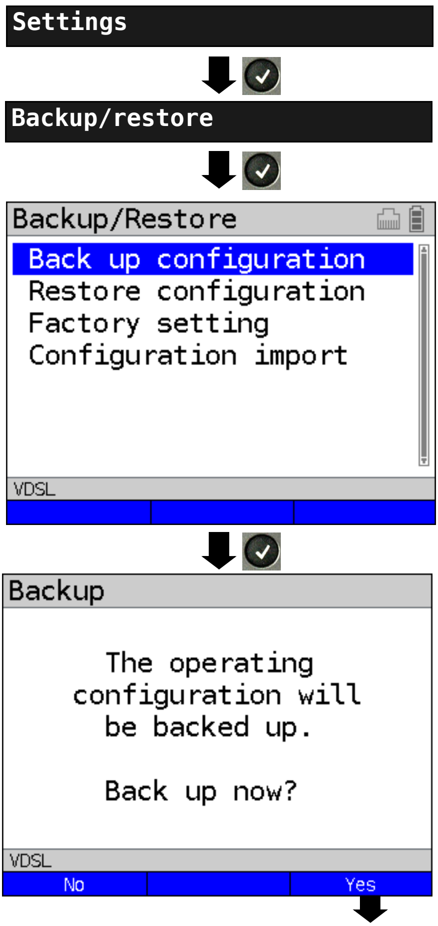
ARGUS offers multiple functions for backing up and restoring settings. In addition to the actual backup/recovery of the settings configured in ARGUS, these also include the options of restoring the factory defaults and importing configurations to overwrite the current one.

25.4.1 Backup / Restore

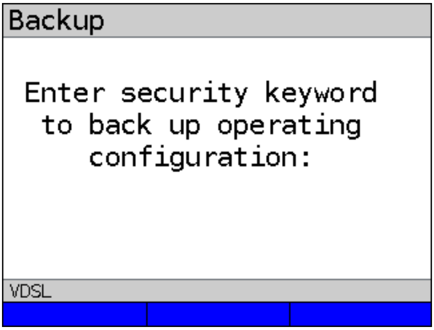
With ARGUS, you can back up all settings (speed dial memory, PPP user name, PPP password, IP addresses, profile names, user-specific details, keypad information and more) and restore them if needed.

Backing up settings

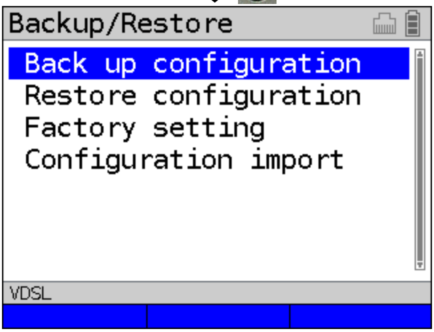
ARGUS in Main Menu



All settings made in ARGUS are backed up unchanged and can thus be restored later.



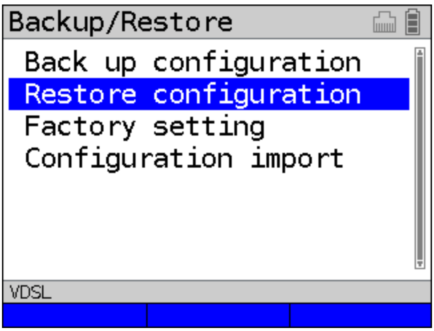
Enter the security password to back up or restore settings. You can obtain this from your Technical Support or directly from intec (see page 10).



The settings are now backed up and can be restored as necessary.

Restoring settings

Select "Restore settings"



and Restores the saved test settings.

If no settings have been backed up, this function has the same effect as "Restore factory setting", see page 305. A security password is not required.

<Yes>

25.4.1.1 Restoring the factory settings

ARGUS resets all settings to the factory defaults.

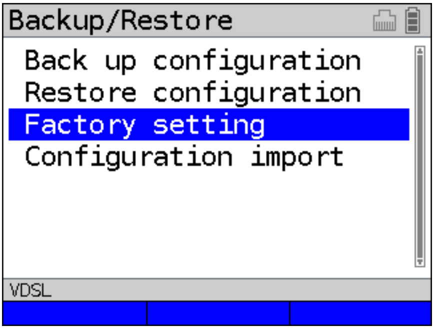
⚠ The speed-dial memory, PPP user name and password, IP addresses, profile-names, user-specific services, keypad information and all test results stored in ARGUS are erased.

Settings

↓ ✓

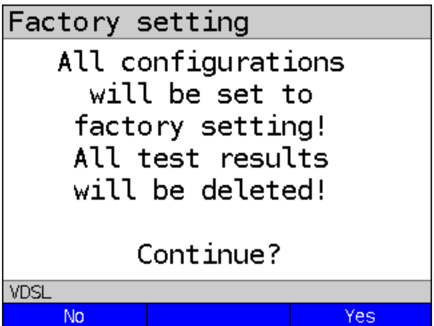
Backup/restore

↓ ✓



All parameters are reset to the factory defaults.

↓ ✓



The following steps are performed as for "Backup settings", see page 303.

✱ and 3: ARGUS jumps directly to the security prompt.

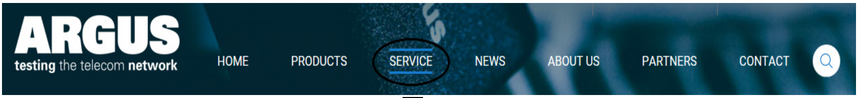
⚠ Enter the security password to delete all settings.
You can obtain this from Technical Support or directly from intec (see page 10).

✱ and 2: Restores the saved test settings.

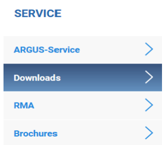
⚠ If no settings have been backed up, this function has the same effect as "Restore factory defaults", see page 304.

26 Update via PC

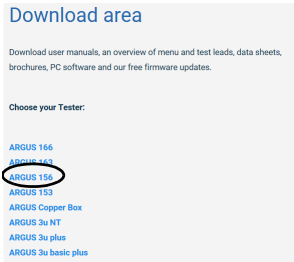
You can download firmware files online free of charge at www.argus.info/service and then upload them to ARGUS.
Go to the Web page www.argus.info.
Click the menu option "Service" (highlighted in blue here) in the navigation bar.



In the drop-down Service menu, click the option "Down-loads".

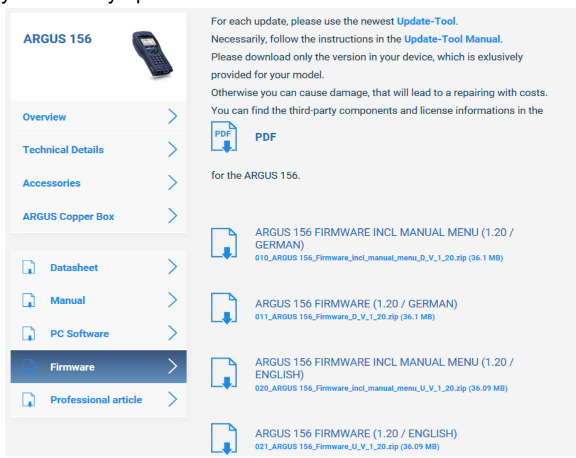


This opens up a product overview.



Select your ARGUS device.

Once you select your device, you are automatically taken to the firmware updates. Select your country-specific firmware variant.



When you select your variant, a browser dialogue opens that enables you to save the firmware to your local PC. The following steps are explained in the WINanalyse manual and in the update tool instructions.

Important information on updating your ARGUS firmware

- Never under any circumstances update ARGUS when it is operating in battery mode.
- Connect ARGUS to the power adapter before uploading the update file from the PC.
- An ARGUS USB cable is required for updating (USB cable with mini-USB plug).
- You should back up the configuration and measurement logs to a PC before performing an update.
- Do not disconnect ARGUS from the PC during the update.
- Do not switch off ARGUS during the update.
- Be sure to observe the messages in the ARGUS display, and not just the instructions of the update tool on the PC.
- The update is only complete when the update tool displays the corresponding message on the PC and ARGUS starts with the "normal" startup screen after being restarted by the update tool.
- ARGUS only powers back up when you click one of the two buttons ("Back to step 1" or "Exit program") at the end of the update.

If problems occur because of a failure to follow these instructions, repeat the update process up to three times. Each repetition makes it possible to overwrite further faulty software components.

When connecting an ARGUS Copper Box, it can occur that ARGUS automatically initialises the Copper Box with the correct firmware in order to avoid compatibility issues. This can take a moment.

27 Using the battery pack

Changing the battery pack

Power down ARGUS and disconnect the power adapter. Then release the knurled screw securing the battery pack.

Handling the battery pack

ARGUS may only be operated using the battery pack supplied with the device; connecting other power supply units to the contacts of the device will damage ARGUS.

- Only charge the supplied battery pack in ARGUS.
- Do not use the ARGUS battery pack in other devices.
- Active charging of the battery pack and automatic charging (on by default) may only be carried out in a temperature range of 0 °C to +40 °C.
- Charge the battery pack completely at least once a month (even if the device has not been used for a longer period!).
- The lithium ion battery pack should be stored with a charge of 40 to 60 %. When storing the device for longer periods, you should refresh this charge level every six months. To prevent full discharge, remove the battery pack from the device for long-term storage.
  To maximise battery life, do not store the battery long-term at temperatures above +50 °C.
- See the chapter Safety information (page 11) for detailed information on using and transporting the lithium ion battery pack safely.

Status

ARGUS indicates the current state of the battery graphically in the display when no power adapter is connected. A battery symbol flashes in the display when it is down to a power reserve of approx. 8 minutes (depending not the operating mode). Tone errors, and in extreme cases malfunctions, can occur in this period. Connect the power adapter. ARGUS can recharge the battery completely when the power adapter is connected. The ARGUS power pack does not require manual discharge. A complete charging process can take up to approx. 6 hours.

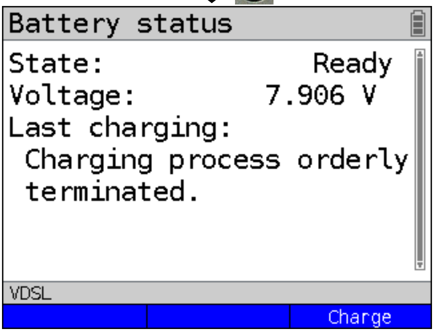
Battery (status, charging)

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Status

Connect the power adapter!
Start the charging process.



During the charging process, ARGUS displays the current status and the voltage.

<Charge> Starts the charging process.

Automatic battery charging in the background

Battery (status, charging)

ARGUS in Main Menu

When ARGUS is in the selection list for preconfigured accesses, you can switch to the abbreviated main menu with .

Automatic charging

on

ARGUS charges the battery automatically in the background when the mains adapter is connected as soon as the battery status falls below a threshold value (battery symbol in display)

ARGUS adopts this setting and switches to the next higher level menu.

When ARGUS is disconnected from the power adapter before that battery is completely charged, ARGUS does not automatically continue charging when it is subsequently reconnected because the charge is no longer below the threshold.

28 Appendix

A) Hotkeys

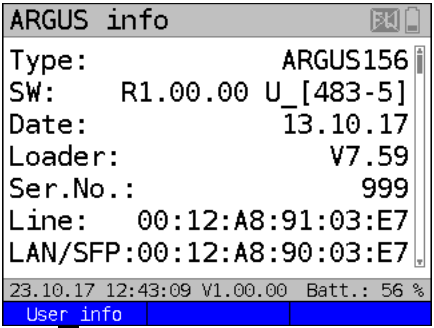
Graphic functions:
After starting the xDSL interface or a test, like Line scope or TDR, you can use the following graphic functions in the result displays:

Hotkey	**xDSL trace**	**ADSL/VDSL, G.fast**	**Line Scope**	**TDR**
Number key 1	Legend	-	-	-
Number key 2	-	Zoom	Zoom	Zoom
Number key 3	Cursor	Cursor	Cursor	Cursor
Number key 4	-	-	Measuring range	Measuring range
Number key 5	-	-	Total power	Pulse width
Number key 6	-	-	-	Wire type/VoP
Number key 7	-	-	Probe	-
Number key 8	-	-	Symmetry	Impedance
Number key 9	-	Setting of x-axis	Time/FFT	Averaging
Number key 0	-	Min/Max	Peak hold	-
Number key #	-	-	100 Ohm input resistance	-
	-	Continue	-	-
	-	-	Run/Hold	Run/Hold
Press one after another  and 	-	-	Reference curve	Reference curve
Press one after another  and 	-	Store	Store	Store

Hotkey assignment

You can call important functions/tests directly using the keys of the ARGUS keypad. Depending on the selected access type (xDSL, G.fast and Ethernet in this example), different hotkeys can be used:

Hotkey	**Service**	**ADSL**	**VDSL/ G.fast**	**SHDSL**	**ETH**
Number key 0	ARGUS status	x	x	x	x
Number key 1	Hotkey help	x	x	x	x
Number key 3	IP ping	x	x	x	x
Number key 4	Traceroute	x	x	x	x
Number key 5	HTTP download	x	x	x	x
Number key 6	Test status	x	x	x	x
Number key 7	FTP download	x	x	x	x
	QR-Code*	x	x	x	-
Number key 8	Copper Box	x	x	x	-
Number key 9	IPTV	x	x	x	x
	Status screen	x	x	x	x
	VoIP call	x	x	x	x
Press one after another  and 	Shortcut to access selection menu.	x	x	x	x
Press one after another  and 	Displays ARGUS-specific infor- mation such as ARGUS type, SW version, Serial number, own MAC addresses, SW options, user info (see next page).	x	x	x	x



The ARGU info displays the ARGUS type, the software version, the serial number and more. The softkey „User info“ opens the entry menu, which you can use to store user-specific information.

<User info> Entering user-specific information (see „Notices“ on page 37)

The user info can be up to 50 characters long. The entered user info is displayed in the ARGUS info below the serial number ARGUS/Copper Box.

<Inv:> Entry of inventory number

The user can enter an inventory number. This data is retained when ARGUS is reset to the factory defaults.

Hotkey	Service	ADSL	VDSL, G.fast	SHDSL	ETH
Press one after another  and 	Restores the saved test settings, see page 304.	x	x	x	x
Press one after another  and 	Resets all settings to the factory default, see page 305.	x	x	x	x
Press one after another  and 	ARGUS saves the current measurement without stopping it. ARGUS automatically suggests a name.	x	x	x	x
Press one after another  and 	Quick start of configuration import.	x	x	x	x
Press one after another  and 	Quick start of cloud update.	x	x	x	x

* You can only use this hotkey when the instrument is within the test parameters.

If a Copper Box was used on ARGUS for the last test, an additional softkey `<Copper Box>` appears, containing all information on the last connected ARGUS Copper Box. Once the Copper Box is started, the information page of the currently connected Copper Box is automatically displayed.

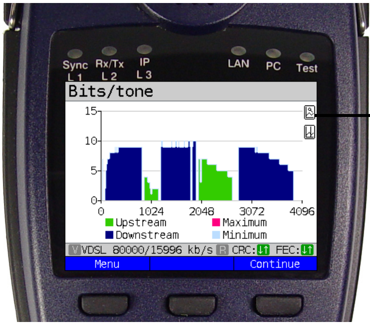
Depending on the selected access type (ISDN, POTS and Copper tests in this example), different hotkeys can be used.

Hotkey	**Service**	**BRI S/T**	**BRI U**	**PRI**	**POTS**	**Cu tests Status**
Number key 0	ARGUS status	x	x	x	x	x
Number key 1	Hotkey help	x	x	x	x	x
Number key 2	Start services test (not for fixed lines)	x	x	x	-	-
Number key 3	Test service features (not for fixed lines)	x	x	x	-	-
Number key 4	Starts an automatic test.	x	x	x	-	-
Number key 5	Sends test results to PC	x	x	x	x	x
Number key 6	Opens Test Manager	x	x	x	-	-
Number key 7	Opens saved numbers	x	x	x	x	-
Number key 9	Starts BERT	x	x	x	-	-
	Level measurement	x	x	L1 Status	x	-
	Connect	x	x	x	x	-
Press one after another  and 	Shortcut to access selection menu.	x	x	x	x	x
Press one after another  and 	Displays ARGUS-specific information, see S. 311.	x	x	x	x	x
Press one after another  and 	Restores the saved test settings, see page 304.	x	x	x	x	x
Press one after another  and 	Resets all settings to the factory default, see page 305.	x	x	x	x	x
Press one after another  and 	Opens Test Manager.	x	x	x	-	-
Press one after another  and 	ARGUS saves the current measurement without stopping it.	-	-	-	-	x

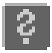
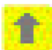
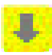
B) Symbols

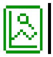
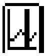
The following symbols can be displayed in the ARGUS status line.

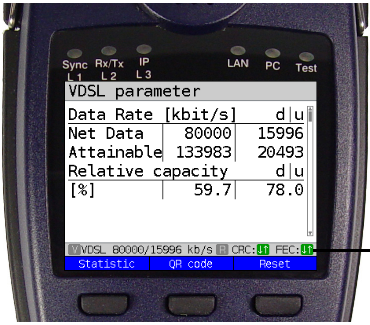
Symbol	Colour	Application	Description
	grey	Accu	This symbol shows the current battery status.
	green	varied	This symbol means that you can use the Shift key to switch to the softkeys.
	green	varied	This symbol shows that Shift is already engaged.
	blue	Cloud update	The firmware can now be updated.
	grey	Cloud update	The update function is active but no update can be found. For example due to an incorrect server path.
	blue	Configuration import	No configuration file found.
	grey	Configuration import	The configuration check is active but no configuration can be found. For example due to an incorrect server path.
	grey	varied	Importing a configuration or executing a test.
	green	WLAN	WLAN is active; ARGUS is currently in access point mode.
	grey	WLAN	WLAN is not active.
	grey	Ethernet	The management interface Ethernet is selected.
	green	Ethernet	The management interface Ethernet is active.
	grey	Volume	Signal tone deactivated.
	grey	Volume	Signal tone activated.



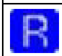
The following symbols can appear in the ARGUS main display area.

Symbol	Colour	Description
	grey	The service is not yet assigned to a virtual line.
	grey	This service, VL or physical layer is idle.
	grey	The service is unavailable.
	yellow	Activating the physical layer, VL or service.
	yellow	Physical layer, VL or service deactivated due to an unexpected occurrence.
	yellow	Deactivating.
	green	Synchronisation achieved (physical layer) or a VL or service was activated successfully.
	green	A test is currently running in this service.
	red	An error has occurred.
	grey	Preparing activation of physical layer, VL or service.
	orange	The Tx and Rx values are not equal in the VoIP QoS test.
	green	Test running.
	red	Test stopped.
	green	Active Probe is active and correctly supplied from ARGUS.

	green	Graphs are zoomed.
	white	Graphs are not zoomed.
	black	Cursor is activated.
	white	Cursor is deactivated.
	red	A signal at the input (e.g. for line scope) is too high or the gain is set too high in the frequency range or time domain, s. page 259



The following symbols are displayed in this field.

Symbol	Colour	Description
	green	No CRC errors occurred in the final second.
	red	FEC errors occurred in the final second in upstream and downstream.
	green / red	No Upstream CRC errors occurred in the final second in upstream.
	red / green	No FEC errors occurred in the final second in downstream.
	grey	Retransmission configured but not active.
	blue	Retransmission working.
	red	Retransmission active.

C) Error message: PPP connection

ARGUS Display	Description
External fault:	
`Negotiation err`	Cannot negotiate the network protocol for PPPD, so the remote site is not reachable.
`Idle release`	Connection was terminated, since there was no activity.
`Time out rel`	Connection was terminated, since the maximum connection time elapsed.
`PPP: Echo req. error`	Remote site did not answer echo requests so the connection has been terminated. (PPP connections are tested at regular intervals by sending echo requests to the remote site.)
`Hanging up rel`	Disconnected by remote site.
`Loopback erro`	The setup of the PPP connection was cancelled, since a loopback was detected.
`Authent. Error`	Authentication error: Wrong user name or password - rejected by remote site.
`PADO timeout`	No PADO packets received.
`PADS timeout`	No PADO packets received.

D) Error message: Download test

ARGUS Display	Description
External fault:	
Http redir.error	Fault: Too many HTTP redirects.
http: no response	No answer from HTTP server.
Http serv.error	HTTP server has returned an error. (for details see the table below "HTTP Error Messages")
Http encod.error	Due to an encoding problem, data transfer with HTTP is not possible.
Ftp open error	Error when opening the FTP connection.
Ftp login error	FTP login error. Wrong user name or password or anonymous login not supported.
Ftp passiv err.	FTP server does not support passive transmission mode.
Ftp rec. error	FTP receive error.
Network error	Network error
Ftp error	General FTP error.
URL error	Fault: No HTTP or FTP URL specified.
Socket error 2	Error when connecting a socket. The server's HTTP service is not available.
Http Head.error	Error in the header of the requested HTTP file.
Ftp no file	FTP download error: No such file or directory found.
Unknown address	Unknown host address. Possible cause: Error in the address entered, DNS resolution not working or network not accessible.
Unknown download error	Unknown download error

E) HTTP status codes:

Display on ARGUS: Code No.	Meaning
100	Client should continue its request.
101	The protocol is being changed at the Client's request.
200	The Client's request has succeeded.
201	The Client's request that a new document be created was successful.
202	The Client's request has been accepted for processing.
203	The Client's request will be answered with information from a source other than the server.
204	The Client's request was successful. The server sends [no content] only the HTTP header.
205	The Client's request was successful. The server [resets content] sends a new HTTP body.
206	The Client's request was successful. The server sends only part of the requested document [partial content].
300	The request was not precise enough so multiple documents have been returned.
303	The requested resource has been found at a different URI and should be retrieved from there.
304	The requested document has not been changed in the interim.
305	The requested document must be retrieved from a proxy instead of from the server.
307	The requested resource has been temporarily relocated to a different URI [temporary redirect].
400	Syntax error in the Client's request [Client error].
401	The request requires user authentication.
402	Payment is required to process this request.
403	The Client's request has been refused. (e.g. because authentication failed.)
404	The requested document was not found (e.g. because of an error in the URL entered or while the document is no longer available).
405	The method specified by the Client in its request is not allowed by the server.
406	The requested document in a format that is not supported by the Client.
407	The request requires that the Client authenticate itself with a proxy.
408	The Client did not place its request within the time allowed by the server [Request Timeout].

409	Due to a conflict (e.g.another request) the Client's request cannot be completed by the server.
410	The requested URL is [gone] no longer available on the server.
411	The Client sent data to the server without a defined Content Length.
412	The preconditions in the Client's request could not be satisfied by the server.
413	The Client's request has been refused by the server because the request entity is too large.
414	The Client sent a URL to the server that is too large (e.g. because of the form values contained).
415	The Client's data is not supported by the server.
416	The range (in a document) requested by the Client does not exist.
417	The server could not (or did not wish to) satisfy the Client's expectation given in the Expect request header field.
424	Due to a failed dependency, the requested document will not be sent by the server.
500	Due to an unexpected condition, the server cannot fulfill the Client's request (e.g. faulty configuration, missing or wrong CGI program).
501	The server does not support the function required to fulfill the Client's request.
502	The server received an invalid response from an upstream server or proxy which it accessed in attempting to fulfill the request.
503	The server is currently unable to handle the request due to a temporary overloading of the server.
504	The Client's request (of a gateway or proxy) did not receive a response within the specified time.
505	The server does not support the HTTP protocol version that was used in the Client's request.

F) General Error Messages

Display on ARGUS	Description
`Prot. not supp.`	The protocol (IP, PPPoE, etc.) is not supported in the selected mode.
`Unknown error`	Unknown error occurred.
`No PPP connec.`	No PPP connection can be setup.
`Test aborted`	Test aborted by user.
`Ping start error`	Error when starting the Ping test.
`Fault: PPP connection`	Unexpected termination of the PPP connection.
`Unexp. PING end`	Unexpected termination of the Ping test.

G) VoIP SIP status codes

SIP requests:

The six basic requests / methods:

INVITE	Invite a user to a session (call - initiates a session)
ACK	Acknowledge an INVITE request
BYE	Terminate a session (hangup)
CANCEL	Terminates the setup of a connection
REGISTER	Provides data regarding subscriber availability (host name and IP address)
OPTIONS	Supplies information regarding the functions supported by the other SIP telephone

SIP responses:

SIP responses are answers to SIP requests. There are six basic types of SIP responses with numerous sub-responses:

1xx	Informational responses (180 indicates for example that the phone of the party called is ringing)
2xx	Reports that the request has been successful
3xx	Redirection responses
4xx	Client failure responses
5xx	Server failure responses
6xx	Global failure responses

Display on ARGUS: Code No.	Meaning	Explanation
100	Trying	The ARGUS is attempting to setup a call.
180	Ringing	The phone at the other end is ringing.
181	Call Being Forwarded	The call is being forwarded.
182	Call Queued	The call is in a wait loop.
183	Session Progress	The call is being setup.
200	OK	Everything is all right.
202	Accepted	Connection has been accepted.

300	Multiple Choices	There is no unique destination address for the remote end. Please select one.
301	Moved Permanently	Calls are being permanently forwarded.
302	Moved Temporarily	Calls are being temporarily forwarded.
305	Use Proxy	A proxy must be used.
380	Alternative Service	Alternative service
400	Bad Request	The request is not OK.
401	Unauthorized	You are not authorized.
402	Payment Required	Payment is required.
403	Forbidden	This is not permitted.
404	Not Found	The remote end was not found or does not exist.
405	Method Not Allowed	The method (e.g. SUBSCRIBE or NOTIFY) is not permitted.
406	Not Acceptable	The options used in the call are not supported.
407	Proxy Authentication Required	The proxy must be authenticated.
408	Request Timeout	The time for the request has been exceeded (timeout).
409	Conflict	There is a conflict.
410	Gone	The subscriber is no longer reachable here.
411	Length Required	The length must be supplied.
413	Request Entity Too Large	The values are too long.
414	Request URI Too Long	The URI is too long. (Destination address)
415	Unsupported Media Type	The codec is not supported.
416	Unsupported URI Scheme	The URI scheme is not supported. (Destination address)
420	Bad Extension	The extension is wrong.
421	Extension Required	An extension is necessary.
423	Interval Too Brief	There is a problem with the SIP parameters. (Register Expire is too short)
480	Temporarily Unavailable	The subscriber is currently not reachable.
481	Call/Transaction Does Not Exist	This connection does not exist (any longer).
482	Loop Detected	A redirection loop has been detected.
483	Too Many Hops	Too many redirects.
484	Address Incomplete	The SIP address is incomplete or faulty.
485	Ambiguous	The SIP address is not unique.
486	Busy Here	The destination is busy.
487	Request Terminated	The request has been terminated.
488	Not Acceptable Here	The call cannot be accepted.
491	Request Pending	A request is waiting.

493	Undecipherable	Decryption error.
500	Server Internal Error	Internal error in the server.
501	Not Implemented	The requested method (functionality) has not been implemented.
502	Bad Gateway	The gateway is bad.
503	Service Unavailable	The service is not available.
504	Server Time-Out	The gateway did not respond in time.
505	Version Not Supported	The SIP protocol version is not supported.
513	Message Too Large	The message length is too long. Use TCP.
600	Busy Everywhere	All terminals are busy at the remote end.
603	Declined	The system at the remote end refused to accept the call.
604	Does Not Exist Anywhere	This user does not exist any longer.
605	Not Acceptable	SIP request not acceptable.

H) Vendor identification numbers

Abbreviation	**Manufacturer**
ALCB	Alcatel (STMicroelectronics)
ANDV	Analog Devices
BDCM	Broadcom
GSPN	Globespan
IKNS	Ikanos
IFTN	Infineon
META	Metanoia
STMI	STMicroelectronics
TSTS	Texas Instruments

I) Software Licenses

The ARGUS firmware includes code from what are known as Open Source packages, which have been published under various licenses (GPL, LGPL, MIT, BSD, etc.).
Additional information can be found – if requested in your order – on the CD-ROM included in the package (see Software_License.htm) or can be viewed at
http://www.argus.info/web/download/Software_License.
In the event that you are interested in the sources licensed under GPL or LGPL, please contact support@argus.info. A machine-readable copy of the source code can be obtained from intec Gesellschaft für Informationstechnik mbH for a minimal fee - to cover the cost of physically copying the code. This offer is valid for 3 years.

J) Abbreviations

	Characters
	Reference to SHDSL (Enhanced SHDSL)
1TR6	Signalling protocol (D-channel protocol) for national ISDN of the former German national PPT (Bundespost)
2B1Q	2 binary 1 quaternary - line code
3PTY	Three party service
4B3T	4 binary 3 ternary - a modified monitored sum 43-code (MMS43)
Δf	Bandwidth
Ω	Ohm (electrical resistance)
	A
A	Ampere (electrical current)
A3K1H	Audio 3.1 kHz
A7kHz	Audio 7 kHz
AAL	ATM adaptation layer
AC	Alternating Current or Access Server
ACS	Auto Configuration Server
ADSL	Asymmetric Digital Subscriber Line
AFTR	Address Family Transition Router
AI	Action indicator
AIT	Application information table
AMP	ARGUS measurement protocol
ANSI	American National Standards Institute
Anx.	Annex
AOC	Advice of charge
AOC-D	Advice of charge: Charging information during the call
AOC-E	Advice of charge: Charging information at the end of the call
APL	("Anschlusspunkt Linie") Service termination point
APN	Access Point Name
ARP	Access Point Name
AS	Available second
ASCII	American Standard Code for Information Interchange
ATM	Asynchronous Transfer Mode
ATU-R	ADSL Transceiver Unit
Auto-MDI-X	Automatic Medium Dependent Interface Crossing
Avg	Average
AWS	("Anrufweiterschaltung") Call forwarding (1TR6)
	B
BC	Bearer capability

BER	1. Basic Encoding Rules 2. Bit error rate
BERT	Bit error rate test
BGP	Border Gateway Protocol
BR	Bridge
BRAS	Broadband access server
BRI	Basic rate interface
	C
C	Celsius
c_0	Speed of light
CALL PROC	CALL PROCeeding message
CAT	Conditional access table
CC	Continuity counter
CCBS	Completion of calls to busy subscriber
CCNR	Call complete no response
CD	Call deflection
CDN	see also CDPN
CDPN	CalleD party number
CF	Call forwarding
CFB	Call forwarding busy
CFNR	Call forwarding no reply
CFU	Call forwarding unconditional
CGN	see also CDPN
CGPN	CallinG party number
CLIP	1. Calling Line Identification Presentation 2. Clipping
CLIR	Calling Line Identification Restriction
CNS	CLIP-no screening
CO	Central office
Codec	Coder decoder
COLP	Connected Line Identification Presentation
COLR	Connected Line Identification Presentation
CONN	CONNect message
CONN ACK	CONNect ACKnowledge message
CQE	Conversational Quality Estimated
CR	Call reference
CRC	Cyclic redundancy check
CT	Call transfer
CUG	Closed user group
CW	Call waiting

	D
DAD	Destination Address (1TR6)
dB	Decibel
dBm/Hz	Performance measurement with the reference quantity 1 mW per hertz
DC	Direct Current
DCE	Data communication equipment
DDI	Direct dialling in
DDM	Digital diagnostic mode
DF	Delay factor
DFU	("Datenfernübertragung") Remote data transmission
DHCP	Dynamic Host Configuration Protocol
DiffServ	Differentiated services
DIN	Deutsches Institut für Normung - German Institute for Standardization
DISC	DISConnect message
DL	Download
DM	("Dienstmerkmal") Service
DMT	Discrete Multitone Transmission
DNS	Domain Name System
DPBO	Downstream power backoff
DSCP	Differentiated services codepoint
DS	DownStream band
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DSS1	Digital Subscriber Signalling System No. 1
DTE	Data Terminal Equipment
DTMF	Dual Tone Multi Frequency
DTU	Data Transmission Unit
	E
E1	Primary Rate Interface
ECT	Explicit call transfer
E-DSS1	European Digital Subscriber Signalling System Number 1
EFM	Ethernet in the First Mile (see protocol IEEE 802.3ah)
EFS	Error Free Seconds
EIT	Event Information Table
ElektroG	Elektro- und Elektronikgerätegesetz, German law governing electrical and electronic devices
EMC	Electromagnetic compatibility
EN	European standard
EoA	Ethernet over ATM
EOC	Embedded operations channel
ES	Errored seconds

ESHDSL	Enhanced SHDSL (SHDSL)
ete	end-to-end
ETH	Ethernet
ETR	Expected Throughput Rate
ETSI	European Telecommunications Standards Institute
	F
F	Farad (unit of electrical capacitance)
Fax G3	Telefax group 3
Fax G4	Telefax group 4
FEC	Forward error correction
FFT	Fast Fourier transform
FSK	Frequency shift keying
FTP	File Transfer Protocol
FV	("Festverbindung") leased line
FW	Firmware
	G
G.fast	G.fast access to subscriber terminal
GB	Gigabyte
Gbit/s	Gigabits per second
GBG	("Geschlossene Benutzer Gruppe") Closed user group
G.hs	ITU-T G.994.1 Handshake procedure
GigE	Gigabit Ethernet
	H
h	hour
HD	High definition
HDLC	High-Level Data Link Control
HDSL	High bit rate digital subscriber line
HEC	Header error checksum
hex	Hexadecimal
HLC	High layer compatibility
HLOG	Amplitude of transmission function per tone
HOLD	Call hold
HRX value	Hypothetical reference value
HTTP	Hypertext Transfer Protocol
HVT	("Hauptverteiler") Main distribution frame
Hz	Hertz (measuring unit of frequency)
	I
IAD	Integrated access device
ID	Identifier
IEEE	Institute of Electrical and Electronics Engineers
IGMP	Internet Group Management Protocol

INFO	INFOrmation Message
INP	Impulse noise protection
IP	Internet Protocol
IPCP	Internet Protocol Control Protocol
IPoA	Internet Protocol over ATM
IPoE	Internet Protocol over Ethernet
IPTV	Internet Protocol Television
ISDN	Integrated Services Digital Network
ISO	International Standards Organization
ISP	Internet service provider
ITSP	Internet telephony service provider
ITC	Independent TC
ITU	International Telecommunication Union
	K
KB	Kilobyte
KVZ	("Kabelverzweiger") Cable branch box
kbit/s	Kilobits per second
	L
L1	Layer 1 in the OSI reference model
L2	Layer 2 in the OSI reference model
L3	Layer 3 in the OSI reference model
LACP	Link Aggregation Procedure for D-channels
LAN	Local Area Network
LAPD	Link access procedure for D-channels
LCD	Liquid crystal display
LCN	Logical channel number
LCP	Link Control Protocol
LED	Light-emitting diode
LLC	Low layer compatibility
LLDP	Link Layer Discovery Protocol
LOS	Loss of synchronize
LOSWS	Loss of sync word seconds
LQO	Listening quality objective
LTE	Long Term Evolution
	M
m	Meter
MAC	Media Access Control
MB	Megabyte
Mbit/s	Megabits per second
MCC	Mobile Country Code
MCID	Malicious call identification

MDF	Main distribution frame (see also HVT)
MDI	Media Delivery Index (RFC 4445)
min.	Minute
MLR	Media loss rate
MMS	Microsoft Media Server Protocol
MNC	Mobile Network Code
Modem	Modulator-demodulator
MOS	Mean opinion score (ITU-T P.800)
MPEG	Moving Picture Experts Group
MSA	Multiple source agreement
MTU	Maximum Transmission Unit
mV_{pp}	Millivolt peak-to-peak
	N
n/a	not available
n/r	not received
n/u	not used
NAT	Network address translation
NGN	Next generation network
NIT	Network information table
NOK	Not OK
NP	Numbering plan
NSAP	Network service access point
NSF	Network specific facilities
NT	Network termination
NTBA	Network termination for ISDN basic rate access
NTR	Network timing reference
	O
OAD	Origination Address (1TR6)
OAM	Operation, Administration and Maintenance
OM	Omni mode
OoS	Out of Sequence
OSI	Open Systems Interconnection
OUI	Organizationally unique identifier
	P
P/N	Part number
PABX	Private automatic branch exchange
PADI	PPPoE active discovery initiation
PADO	PPPoE active discovery offer
PADR	PPPoE active discovery request
PADS	PPPoE active discovery session confirmation
PADT	PPPoE active discovery termination

PAP	Password Authentication Protocol
PAT	Program association table
PC	Personal computer
PCR	Program clock reference
PD	Protocol discriminator
PDU	Protocol data unit
PEN	Private Enterprise Number
PID	Packet identifier
PLR	Packet loss ratio
PMT	Program map tables
POTS	Plain old telephone service (PSTN)
P-P	Point-to-point
P-MP	Point-to-multipoint
PMMS	Power Measurement Modulation Session
PMS	Physical media specific
PPP	Point-to-Point Protocol
PPPoA	Point-to-Point Protocol over ATM
PPPoE	Point-to-Point Protocol over Ethernet
PPTP	Point-to-Point Tunneling Protocol
PRI	Primary rate interface
PSD	Power spectral density
PSI	Program specific information
PWR	Power
	Q
Q in Q	IEEE 802.1.ad, S-VLAN
QLN	Quiet line noise
QoS	Quality of service
	R
RC	Resistance (R) and capacitance (C)
REIN	Repetitive electrical impulse noise
REL	RELease message
REL ACK	RELease ACKnowledge message
REL COMPL	RELease COMPLete message
RF	Radio frequency
RFC	Request for comments
RJ	Registered jack (standardised socket)
RoHS	Restriction of Hazardous Substances
RT	Router
RTCP	Real-Time Control Protocol
RTP	Real-Time Transport Protocol
RTSP	Real-Time Streaming Protocol

Rx	Received
	S
s	second
S/N	Serial number
SBC	Session Border Controller - Outbound Proxy
SCI	Sending complete indication
SDT	Service description table
Segm.	Segmented
SES	Severely errored second
SFF	Small form factor
SHINE	Single high impulse noise event
SIN	Service Indicator (1TR6)
SIP	Session Initiation Protocol
SNR	Signal-to-noise ratio
SNRM	Signal-to-Noise ratio margin
SPB	Shortest Path Bridging
Spch	Speech
SRU	SHDSL Regeneration Unit
SRV	Service record
SSL	Secure Sockets Layer
STB	Set-top box
STU-C	SHDSL Transceiver Unit - Central Office
STU-R	SHDSL Transceiver Unit - Remote
STUN	Session Traversal Utilities for NAT
SUB	Subaddressing
SUSP	SUSPend message
	T
T	Trigger
TAC	Type Approval Code
TAL	("Teilnehmeranschlussleitung") Subscriber line
TC	1. Trellis code
	2. Transmission convergence
TCP	Transmission Control Protocol
TDM	Time division multiplex
TDR	Time domain reflectometry
TDT	Time and date table
TE	TErminal, terminal equipment
TEI	Terminal endpoint identifier
Tel31	Telephony 3.1 kHz
Tel7k	Telephony 7 kHz
TLS	Transport Layer Security

TM	Test manager
ToN	Type of Number
ToS	Type of service
TP	Terminal portability
TPID	Tag Protocol Identifier
TS	1. Technical specification
	2. Transport stream
TTX	Teletext
Tx	Transceived
	U
UDP	User Datagram Protocol
UL	Upload
URI	Uniform Resource Identifier
URL	Uniform Resource Locator
US	VDSL: Upstream band
USB	Universal Serial Bus
UTC	Coordinated Universal Time
UUI	User-user info
UUS	User-to-user signalling
	V
V	Volt
V/2	Pulse propagation time
VC	Virtual channel
VCC	1. Virtual channel connection
	2. Voltage at the common collector
VCI	Virtual channel identifier
VC-MUX	Virtual circuit multiplexing
VDSL	Very High Speed Digital Subscriber Line
ViSyB	Video syntax-based
ViTel	Video telephony
VLAN	Virtual Local Area Network
VL	Virtual line
VLC	Video LAN client
VNC	Virtual Network Computing
VoD	Video on demand
VoIP	Voice over Internet Protocol
VoP	Velocity of propagation
VPI	Virtual path identifier
$\mathbf{V_{pp}}$	Volt peak-to-peak
VTU-R	VDSL transceiver unit
	W

WebDAV	Web-based Distributed Authoring and Versioning
WEEE	Waste Electrical and Electronic Equipment
www	World Wide Web
	X
xDSL	Collective term for the different DSL variants
xTU-C	xDSL Transceiver Unit - Central Office
xTU-R	xDSL Transceiver Unit
	Z
Z	Apparent resistance

K) Index

A

B

P

Q

R

S

T

U

V

W

X

Y

Z