SmartClass ADSL

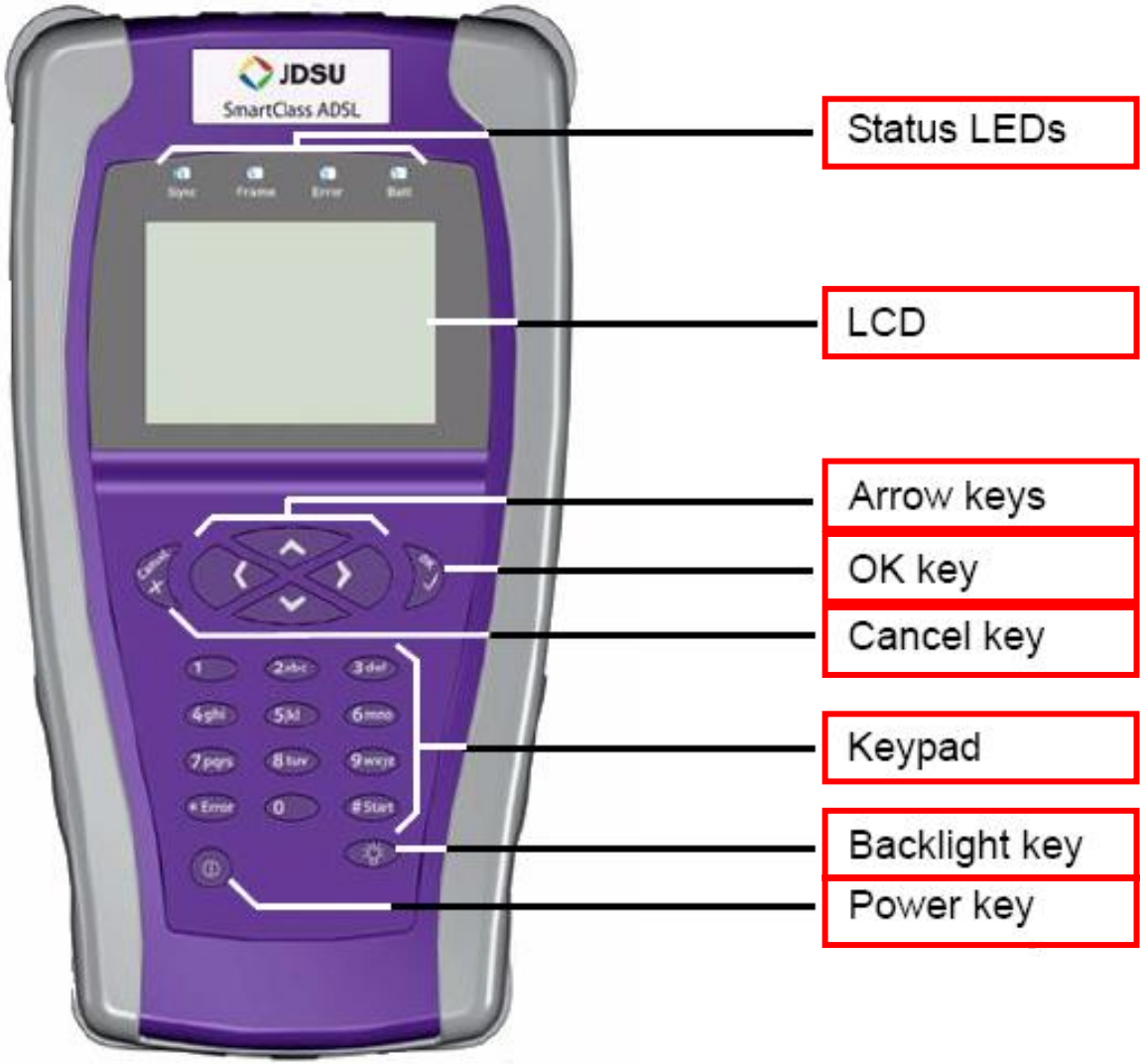
Instrument Features and Capabilities

SmartClass ADSL – Enabling Triple Play

IP Video	Channel Change/Zap Test Video Quality – QoS PID Map Stream Rates
IP Data	FTP Throughput HTTP WEB Test IP Statistics PING
ADSL2+	ADSL2+, Annex A/B/L/M Bits-per-tone & SNR VCC Scan, OAM F4/F5 DSL Quick Test
Copper	Cable Check DVOM Capacitance Leakage Balance

SmartClass ADSL Overview

Exploring the Front Panel



Exploring the Connector Panel

Exploring the Connector Panel

Connect the 3 test leads to the mini-Banana connectors on the top:

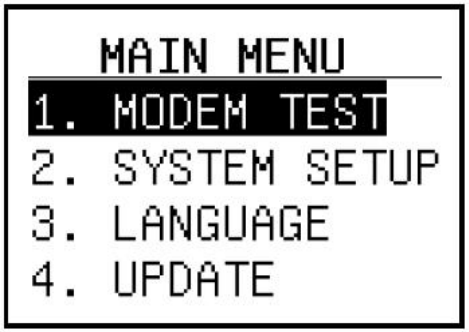
- **Red to A**
- **Black to B**
- **Green to Earth**

Exploring the Bottom Panel

Navigating the User Interface

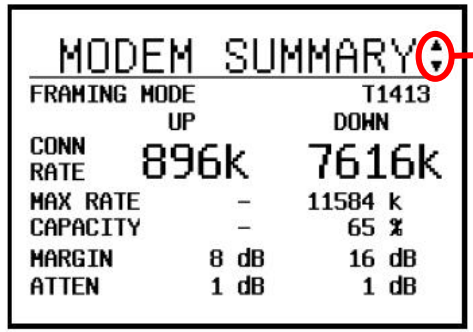
3 types of screens:

Meny screens



Example

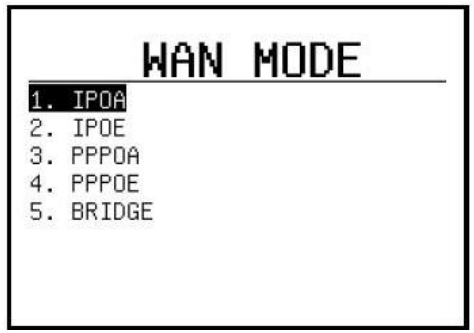
Results screens

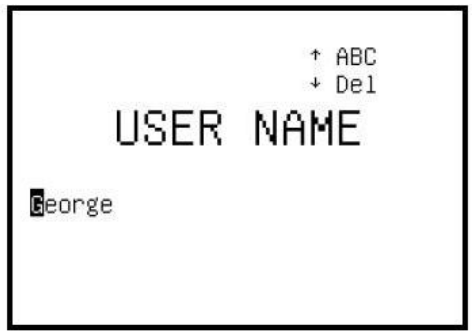


Example

These arrows indicate more items are available by pressing the up or down arrow key

Data entry screens





Example

SmartClass ADSL

Instrument Settings

Instrument Settings

- **SW VERSION**
  - Boot code
  - ATM driver
  - Annex A or B
- **DATE-TIME**
  - Enter date and time
  - Change date format
- **CONTRAST**
  - 0 – 100%
- **AUTO POWER**
  - OFF, 5, 10 or 15 mins
- **FACTORY DEFS**
  - Factory defaults

SmartClass ADSL

ADSL Testing

Connecting the SmartClass ADSL to the Line

Trivial menu navigation

- Arrow keys navigate
- ”OK” makes selection
- ”Cancel” returns to previous menu
- Telephone keypad for data entry

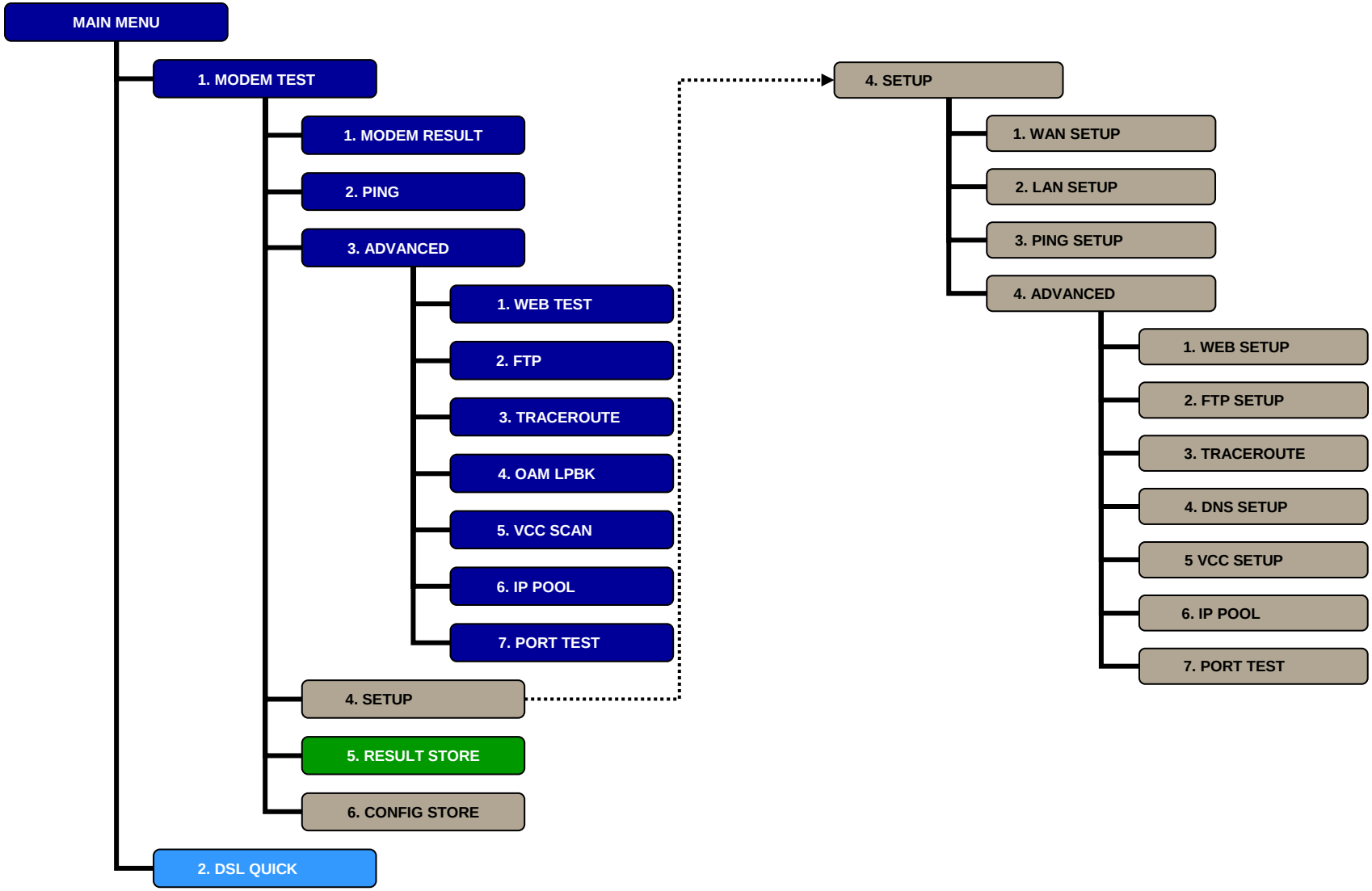
Immediate access to key results

- Click ”OK” twice to get modem statistics
- No configuration required

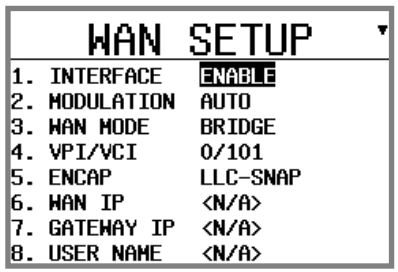
SmartClass ADSL

Configuring Tests

Specifying Test Configuration Settings



Specifying Test Configuration Settings



WAN Settings

- Select **MODULATION** type
  - **ADSL2+**
  - **ADSL2+ DELT** Double Ended Line Test
  - **ADSL2**
  - **ADSL2 DELT** is PPP over Ethernet
  - **G.DMT** (European ADSL1)
  - **G.LITE**
  - **T1.413** (N. American ADSL1)
  - **AUTO**
- Select **WAN MODE**
  - **IPoE** is IP over Ethernet
  - **IPoA** is IP over ATM
  - **PPPoA** is PPP over ATM
  - **PPPoE** is PPP over Ethernet
  - **Bridge** is used in Ethernet mode
- Enter the **VPI** and **VCI** *(most common is 8/35)*
  - **VPI:** 0 - 255
  - **VCI:** 0 - 65636
- Select **ENCAP** (encapsulation) method
  - **LLC-SNAP**
  - **VC-MUX**
- Enter the **Gateway** IP address
  - **Static**
  - **Dynamic**
- Enter the **User Name**
  - a valid user account with an ISP
- Enter the **Password**
  - This must be a valid password that matches the user name above. Passwords are often case-sensitive

Specifying Test Configuration Settings

LAN SETUP	
1. INTERFACE	ENABLE
2. LAN IP	STATIC
3. DHCP START	192.168.0.6
4. DHCP SERVER	ON
5. GATEWAY IP	STATIC<WAN>

PING SETUP	
1. PING	80.160.76.42
2. TX PINGS	5
3. PACKET SIZE	64
4. TIMEOUT(s)	1.0

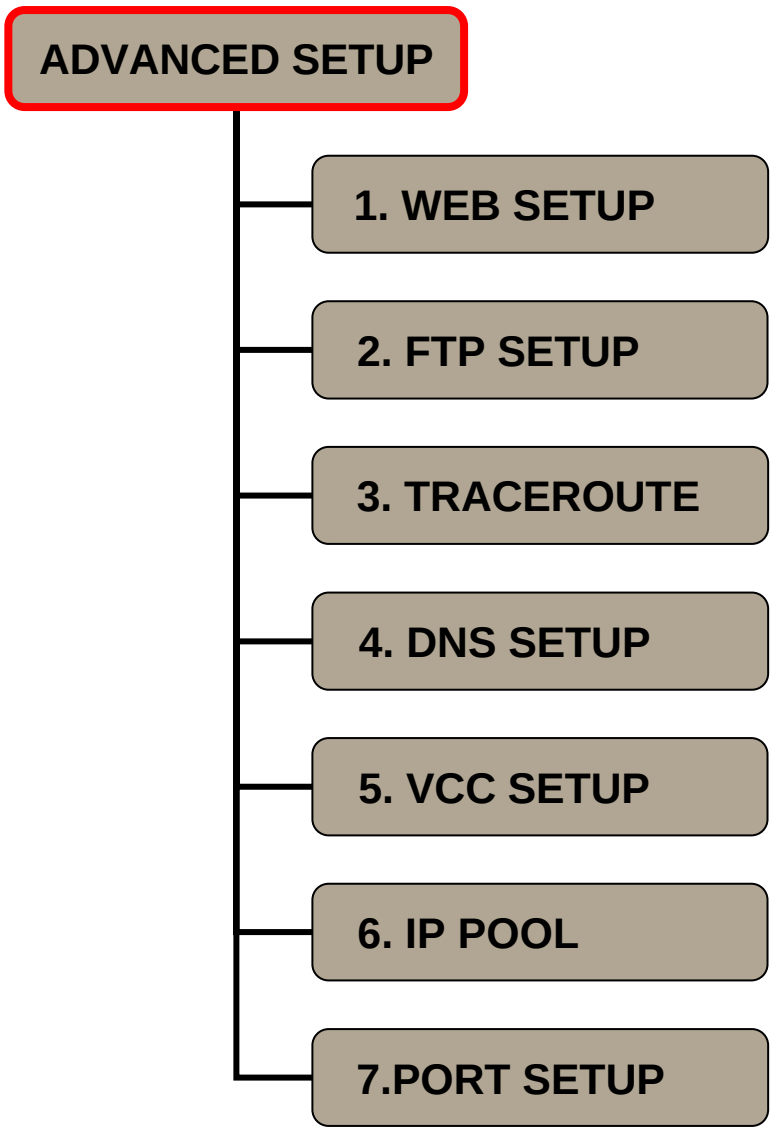
LAN Settings

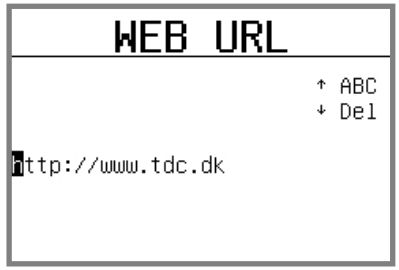
- Enter **STATIC** or **DYNAMIC** IP address
- Enter **LAN IP** address
- Enter the **DHCP START** address
  - If DHCP Server is enabled below, this is the starting IP address for the tester's DHCP server
- Select **DHCP SERVER** and enable or disable the tester's DHCP server

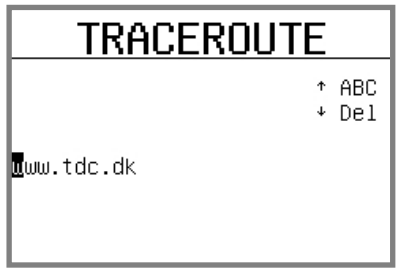
PING Settings

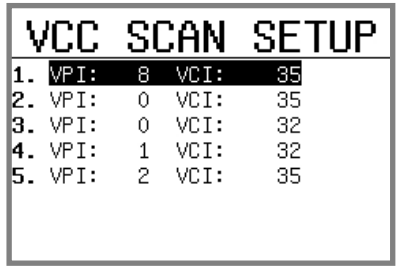
- Enter the **PING IP**
  - This is the destination address (where you will send the pings)
- Enter the **TX PINGS**
  - This is the number of ping messages to send (0 – 20)
  - To specify continuous ping, enter zero (0)

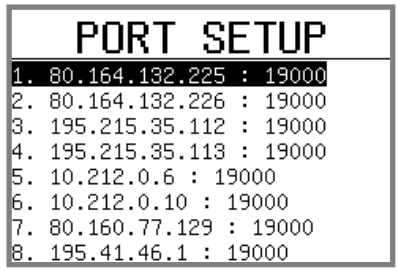
Specifying Advanced Test Configuration Settings

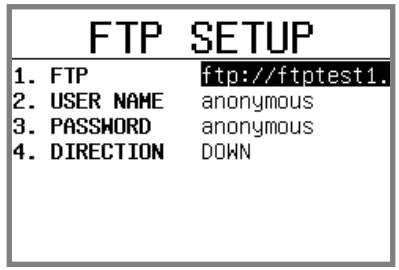


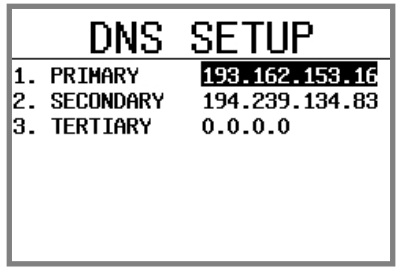


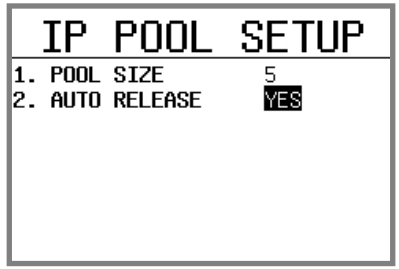






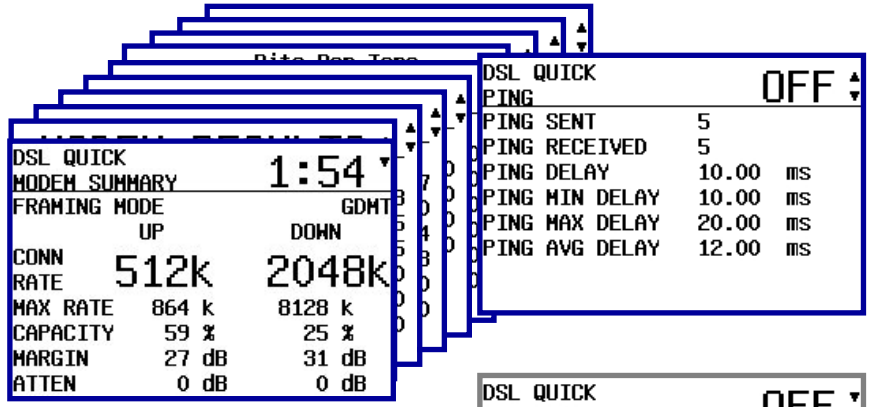


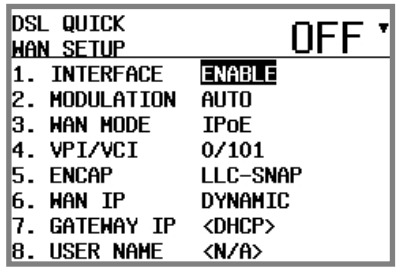


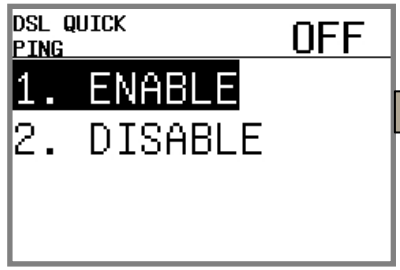


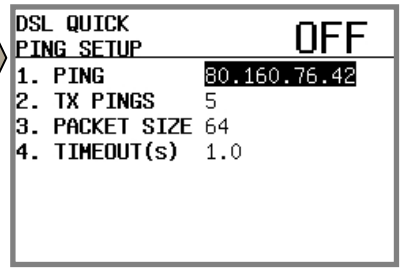
DSL Quick

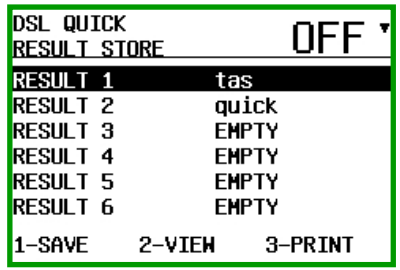
- **After the modems have achieved synchronization, the results screen appears and statistics are gathered and displayed.**
- **The modem will automatically disconnect after 2 minutes to save battery but the results will be held in view until you exit the test.**











Saving and Loading Test Configurations

After you specify settings for a configuration, you can store the configuration, and then run tests in the future using the same, or edited settings

To save time, you can **define and store up to 8 configurations** using your most common settings, and then load an existing configuration and edit the settings as needed for your current test.

To SAVE a configuration:

- Select MODEM TEST
- Select CONFIG STORE
- You may have to scroll down to view the CONFIG STORE selection
- Scroll to the desired location number
- Press the 1 key
- Enter the file name
- Press the OK key

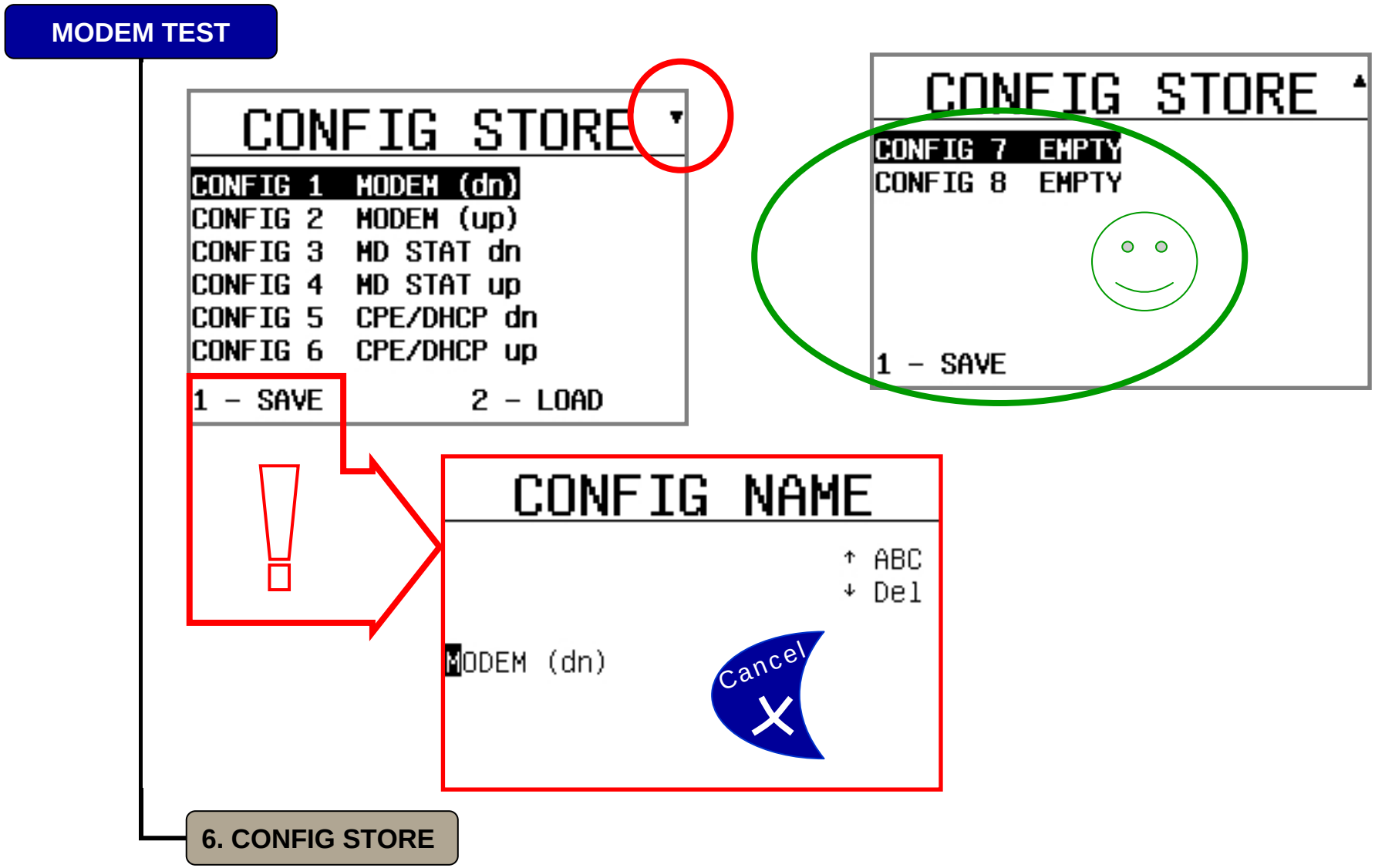
The test configuration is stored

To LOAD a configuration:

- Select MODEM TEST
- Select CONFIG STORE
- Scroll to the desired file name to load
- Press the 2 key
- Press the OK key

The test configuration is loaded

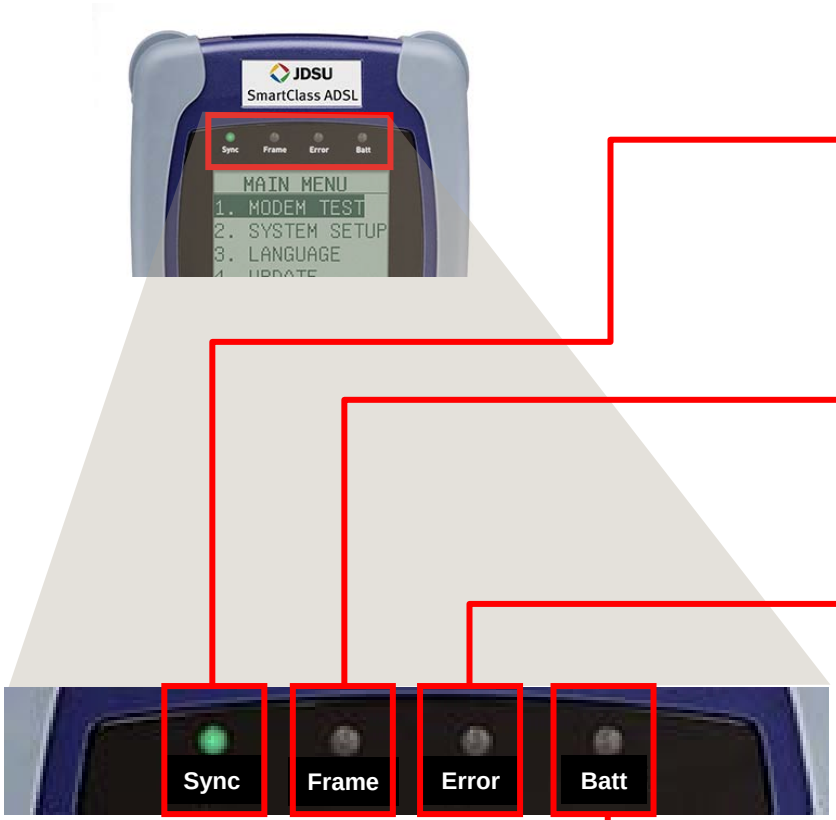
Saving and Loading Test Configurations



SmartClass ADSL

Interpreting Test Results

LEDs



Sync

Reports the status of modem synchronization

- **Flashing green indicates that the modems are training**
- **Solid green indicates that the modems are synchronized**

Frame

Reports the status of the data connection. Solid green indicates that a data connection has been established with the network (so that the ADSL Tester may send and receive data on the network)

Error

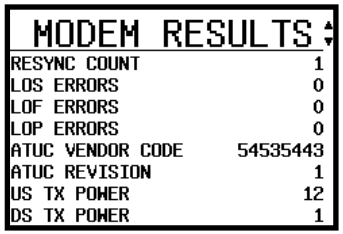
Reports modem error conditions. (Currently not used)

Batt

A multi-color LED that indicates the battery status.

- **Solid green indicates that an external source is powering the unit.**
- **Solid red indicates a low battery.**
- **Solid amber indicates the battery is charging.**
- **Flashing amber indicates that the battery type must be specified.**

Modem Summary Results



MODEM SUMMARY RESULTS		
MODEM STATE	The current operational state for the modem. (only shown when modems are not synchronized.)	BOOTING, IDLE, INIT
FRAMING MODE	The current ADSL line format.	G.DMT, G.Lite, T1.413, ADSL2, ADSL2+
CONN RATE	Connection Rate: Current upstream and downstream connection rates	32–12000 kbps (Up) 32–25000 kbps (Dn)
MAX RATE	Maximum upstream and downstream connection rates	32–12000 kbps (Up) 32–25000 kbps (Dn)
CAPACITY	The percentage of total bandwidth currently used by the actual connect rate upstream and downstream	0–100%
MARGIN	Noise margin upstream and downstream	0–63.5 dB
ATTEN	Attenuation. The degradation of signal strength in dB upstream and downstream. It is the difference in Tx power from the transmitter to receiver	0–63.5 dB
RESYNC COUNT	The number of synchronization attempts. it is possible that modems do not synchronize immediately and make multiple attempts before achieving synchronization.	
LOS/LOF/LOP ERRORS	Loss of Signal/Frame/Power Errors. Number of errors due to loss of signal/frame/Power.	
ATUC VENDOR CODE/ ATUC REVISION	The identification code of the ATU-C vendor. Indicates the manufacturer of the ATU-C card in the DSLAM. ATUC REVISION is the software revision of the ATU-C.	
US/DS TX POWER	The Upstream and Downstream Transmit Power	

Modem Summary Results - MARGIN

MARGIN in SmartClass ADSL means ”Signal to Noise Ratio (SNR) Margin” defined by the ITU-T standards as *SNRM*.

This is the additional dB of noise the line can tolerate and still maintain minimum Bit Error Rate, BER, level (usually 10^{-7}), and is summed over the tones.

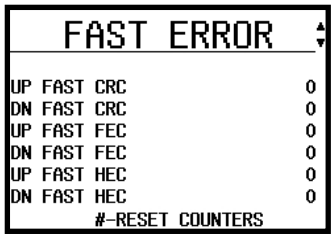
In practical, this means the number of dB of signal you have above the point at which the hardware will not function.

This information is calculated and exchanged between the ATU-C and ATU-R during Initialization Channel Analysis Phase.

For actual SNR for each tone or sub-carrier, please refer to the SNR table or graph screen.

For more details, please refer to ITU-T Rec. G.992.3 ADSL2 – Chapter 8.12 Test Parameters

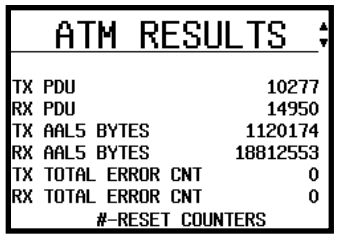
Interleaved and Fast Errors



INTERLEAVED ERRORS	
INTLV CRC	Interleaved Cyclical redundancy check upstream and downstream
INTLV FEC	Interleaved Forward Error Correction upstream and downstream
INTLV HEC	Interleaved Header Error Correction upstream and downstream

FAST ERRORS	
FAST CRC	Fast Cyclical redundancy check upstream and downstream
FAST FEC	Fast Forward Error Correction upstream and downstream
FAST HEC	Fast Header Error Correction upstream and downstream

ATM Results



ATM GENERAL	
GOOD CELL CNT	Total number of cells that contain data and reached the other end error free.
IDLE CELL CNT	Total number of idle cells.
BAD HEC CELL CNT	Total number of cells that were bad due to HEC errors
DROPPED CELL CNT	Total number of dropped cells. The ATM network will discard or “drop” erred cells which must then be retransmitted (this is done automatically). The SmartClass counts the number of ATM cells and how many were dropped, giving an indication of service quality.

ATM RESULTS	
TX/RX PDU	The PDU upon which cells are being transmitted or received.
TX/RX AAL5 BYTES	Total number of ATM AAL5 frames received by the ADSL Tester, which were too short or too long due to errors
TX/RX TOTAL ERROR CNT	Total number of ATM errors, including bad HEC and dropped cells

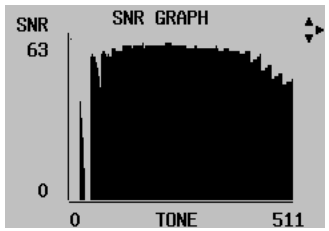
OAM Results

OAM RESULTS	
F5 LB CNT	The number of ATM F5 Loopback requests on the near and far end
F4 LB CNT	The number of ATM F4 Loopback requests on the near and far end.

Ethernet Results

ENET RESULTS	
ENET STATE	Status of the connection.
ENET TX BYTES	Total bytes transmitted
ENET TX FRAMES	Total frames transmitted
ENET COLLISIONS	Ethernet frames are transmitted “space-available” when there is a break on the signal on the cable; sometimes frames are transmitted at the same time as another transmitter, causing a “collision” of frames.
ENET TX ERRORS	Total errors transmitted
ENET RX BYTES	Total bytes received
ENET RX FRAMES	Total frames received
ENET RX CRC ERRORS	Total CRC errors received

Graphs



The graphs provide a graphical representation of the bits per tone (BPT) and signal to noise ratio (SNR).

SNR indicates line quality

The BPT graph indicates the total bit rate and is a useful tool for finding disturbers.

Bits per tone is defined as bits assigned per DMT tone (256 tones for ADSL, 512 for ADSL2+). Examine the portions of the graphs where there are dips or breaks. These dips represent areas where interference is degrading the ADSL signal.

WAN Status Results

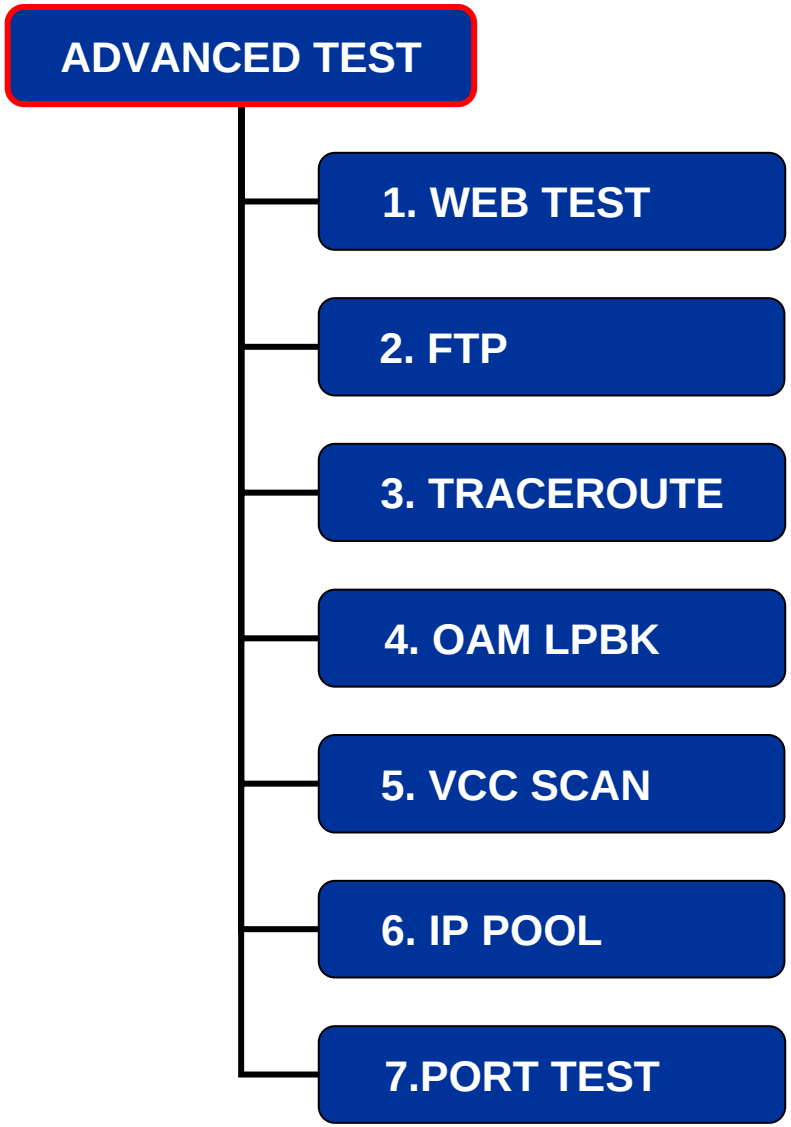
The WAN status result screen reports the current status of the WAN:

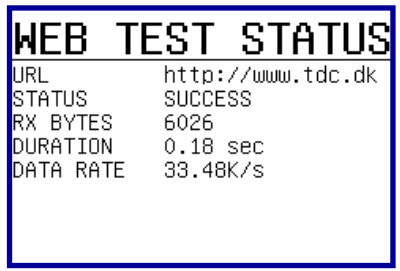
- **Configuring**
- **Starting**
- **PPP connecting (only if using a PPP mode)**
- **Network Up**
- **Network down**

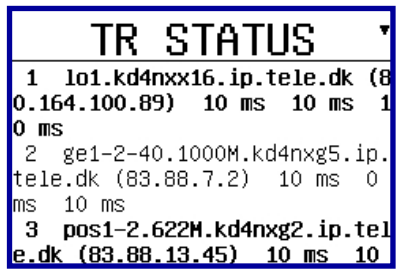
Ping Results

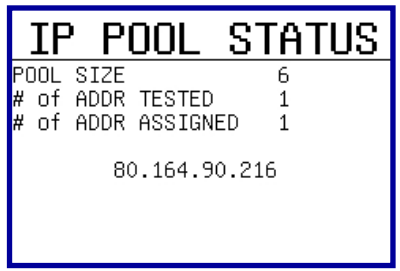
ETNET RESULTS	
PING SENT	The number of ping messages sent.
PING RECEIVED	The number of ping messages sent to the ADSL Tester from other devices on the network.
PING DELAY	The current time in milliseconds it has taken one transmitted ping to reach its destination and receive a reply back to the ADSL Tester.
PING MIN DELAY	The shortest time in milliseconds it has taken any one transmitted ping to reach its destination and receive a reply back to the ADSL Tester.
PING MAX DELAY	The longest time in milliseconds it has taken any one transmitted ping to reach its destination and receive a reply back to the ADSL Tester.

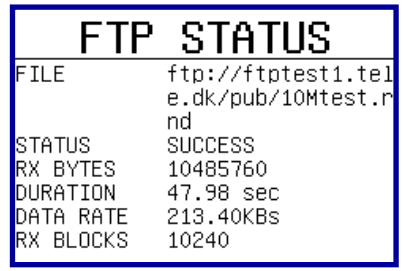
Advanced Test Results

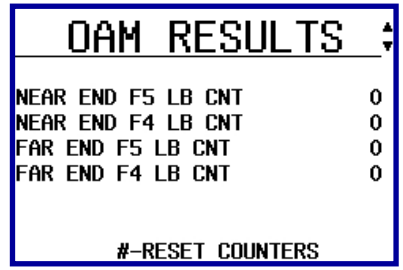


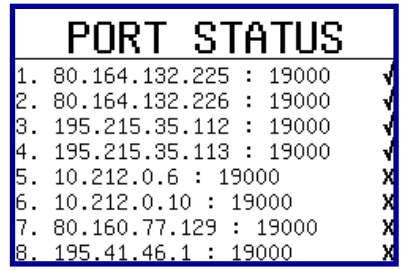












Saving, Viewing, Printing and Import Test Results

After running a test, you can save the results, and then view, print, or import them into Excel at a later time.

You can **store up to 16 sets of test results**.

To SAVE test results

- After your test is finished, press the Cancel key to go back one menu to MODEM TEST.
- Select RESULT STORE.
- Scroll to the desired location number.
- Press the 1 key.
- Enter the file name.
- Press the OK key

The test results are stored.

SmartClass ADSL

Copper Testing

About SmartClass ADSL Copper Testing

The SmartClass Tester's copper features allow quick turn-up and basic troubleshooting of the copper local loop.

The copper features include two quick tests:

- **CABLE CHECK, auto test**
- **SNAPSHOT**

You can also perform specific measurements for the following tests (called MEASURE):

- **AC volts**
- **DC volts**
- **Resistance**
- **Leakage**
- **Distance to short**
- **Opens (distance) and capacitance**
- **DC current**
- **Balance**
- **Load coil detect**

Extreme Ease of Use

```
    MAIN MENU
1. MODEM TEST
2. DSL QUICK
3. COPPER TEST
4. SYSTEM SETUP
```

OK

```
COPPER TEST
  CABLE CHECK
2. SNAPSHOT
3. MEASURE
4. SETUP
```

OK


```
DC VOLTS
+0.0 V (TR)
LOW:-10.0      HIGH:+10.0

          ACT     LOW     HIG
>1.TR   +0.0    +0.0    +0.0
 2.TG     -       -       -
 3.RG  +10.0    -5.2   +10.7
```

Extreme Ease of Use

DC VOLTS

+0.0 V (TR)
LOW:-10.0 HIGH:+10.0

	ACT	LOW	HIG
>1.TR	+0.0	+0.0	+0.0
2.TG	-	-	-
3.RG	+10.0	-5.2	+10.7

AC VOLTS

0.1 V(AB)
TERMINATION(#): 100KOhm

	ACT	LOW	HIG
>1.AB	0.1	0.1	0.1
2.AE	-	-	-
3.BE	-	-	-

RESISTANCE

>100.0 MΩ(TR)
Distance to Short N/A

	ACT	LOW	HIG
>1.TR	100.0M	100.0M	100.0M
2.TG	-	-	-
3.RG	-	-	-

Connecting the SmartClass ADSL to the dry Copper line

- **Connect the 3 test leads to the mini-Banana connectors on the top:**
  - **Red to A**
  - **Black to B**
  - **Green to Earth**

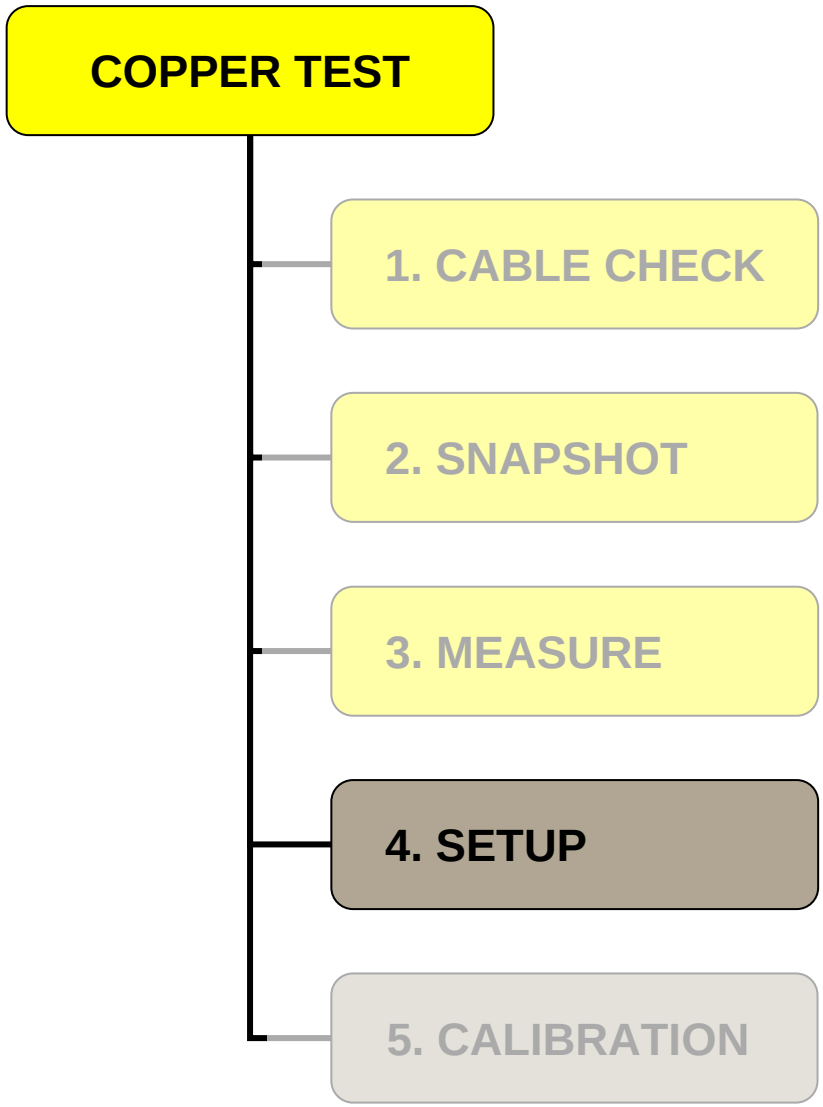
300 V MAX is a peak value

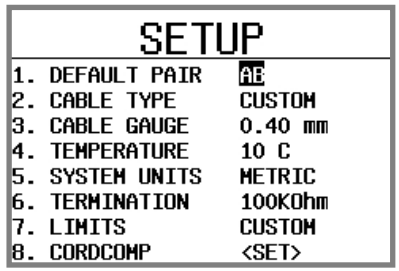
Never connect and test on the 230 VAC mains power

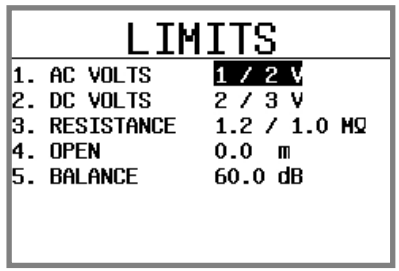
SmartClass ADSL

Configuring Tests

Specifying Test Configuration Settings – SETUP

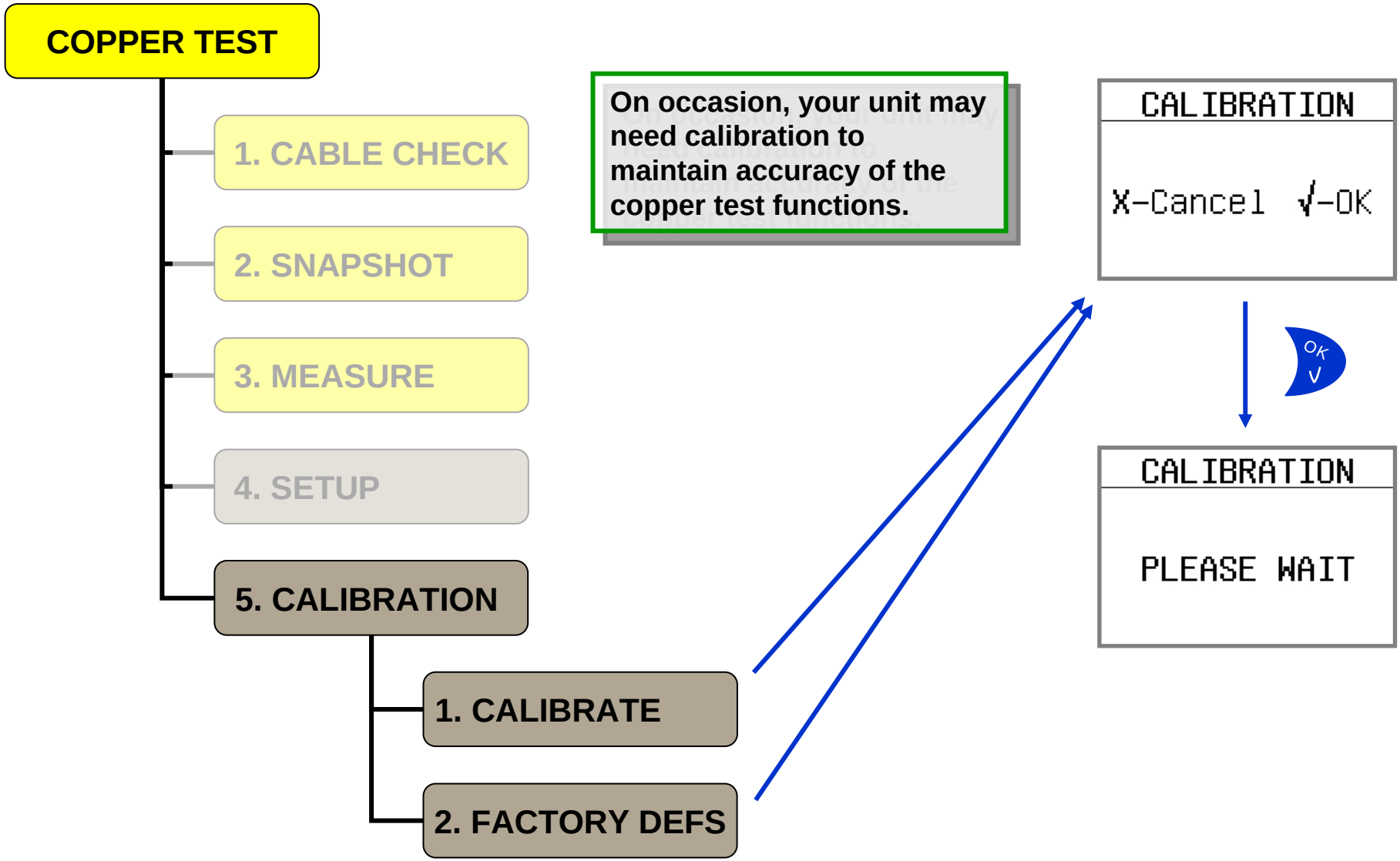




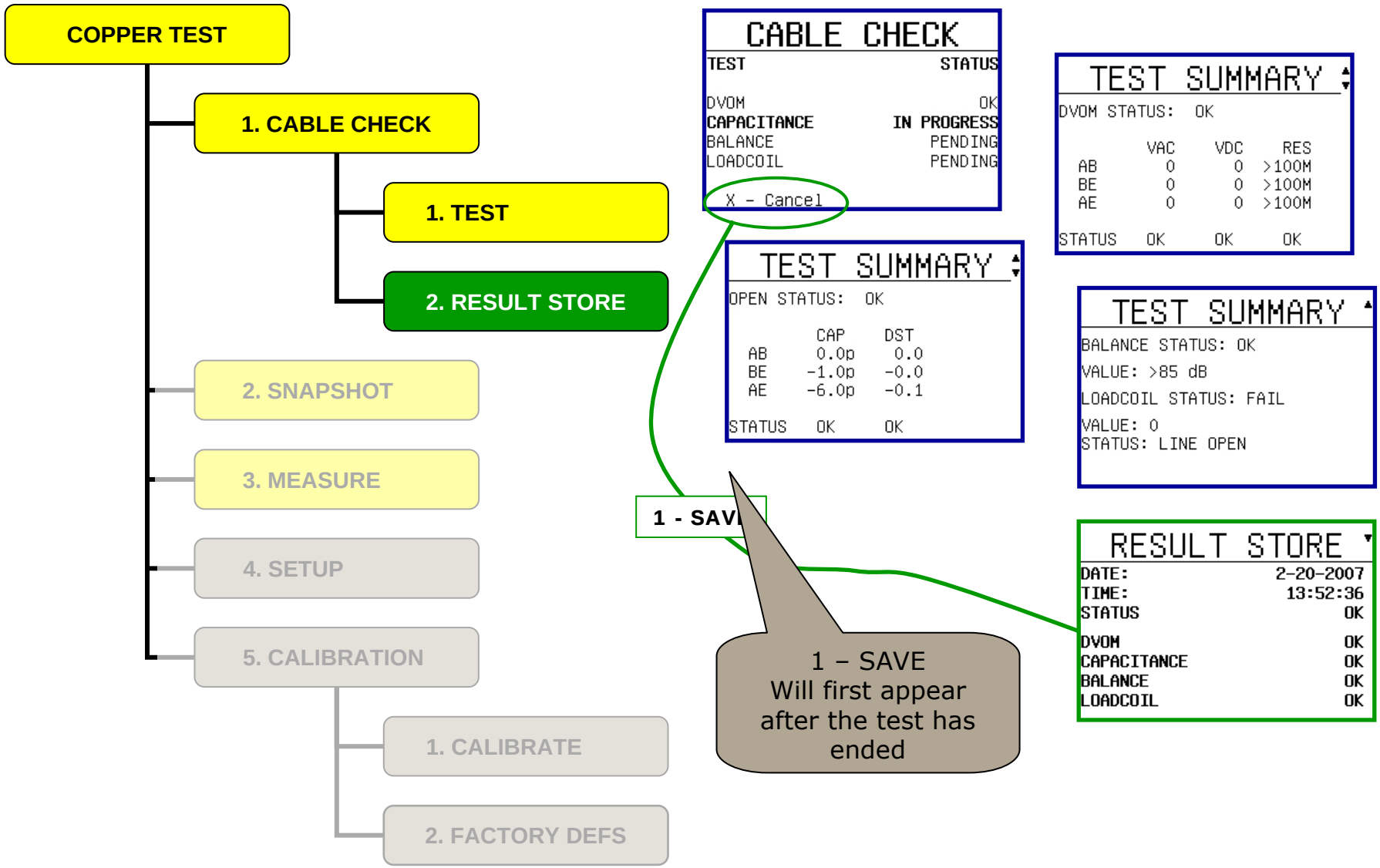


For greatest accuracy, JDSU also recommends that you perform a cord compensation to remove the effects of the test leads from the test measurements. There are two scenarios for compensation: all leads open and all leads shorted.

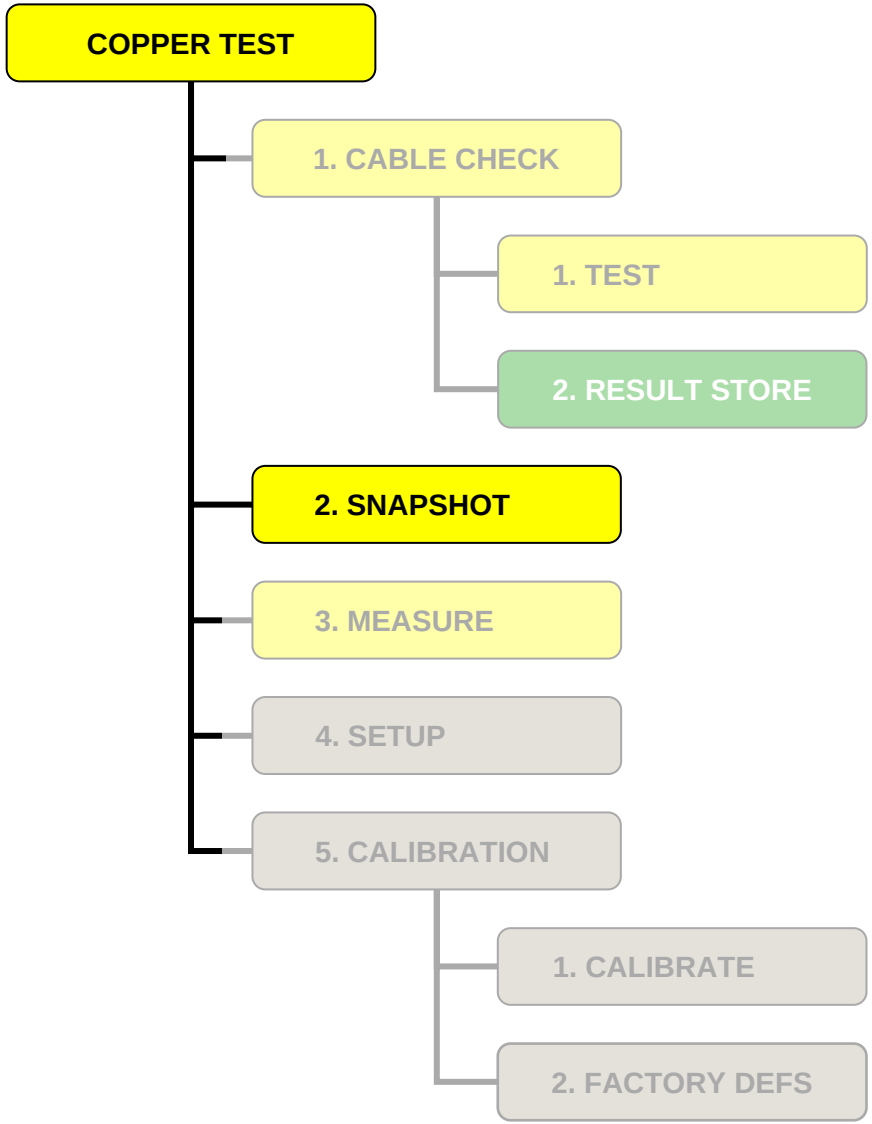
Calibration and Factory Defaults

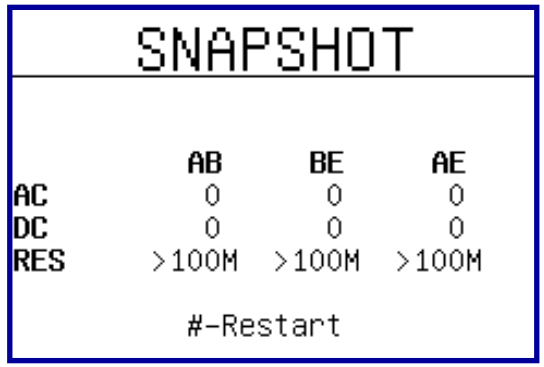


CABLE CHECK



SNAPSHOT





The SNAPSHOT feature performs a quick test of

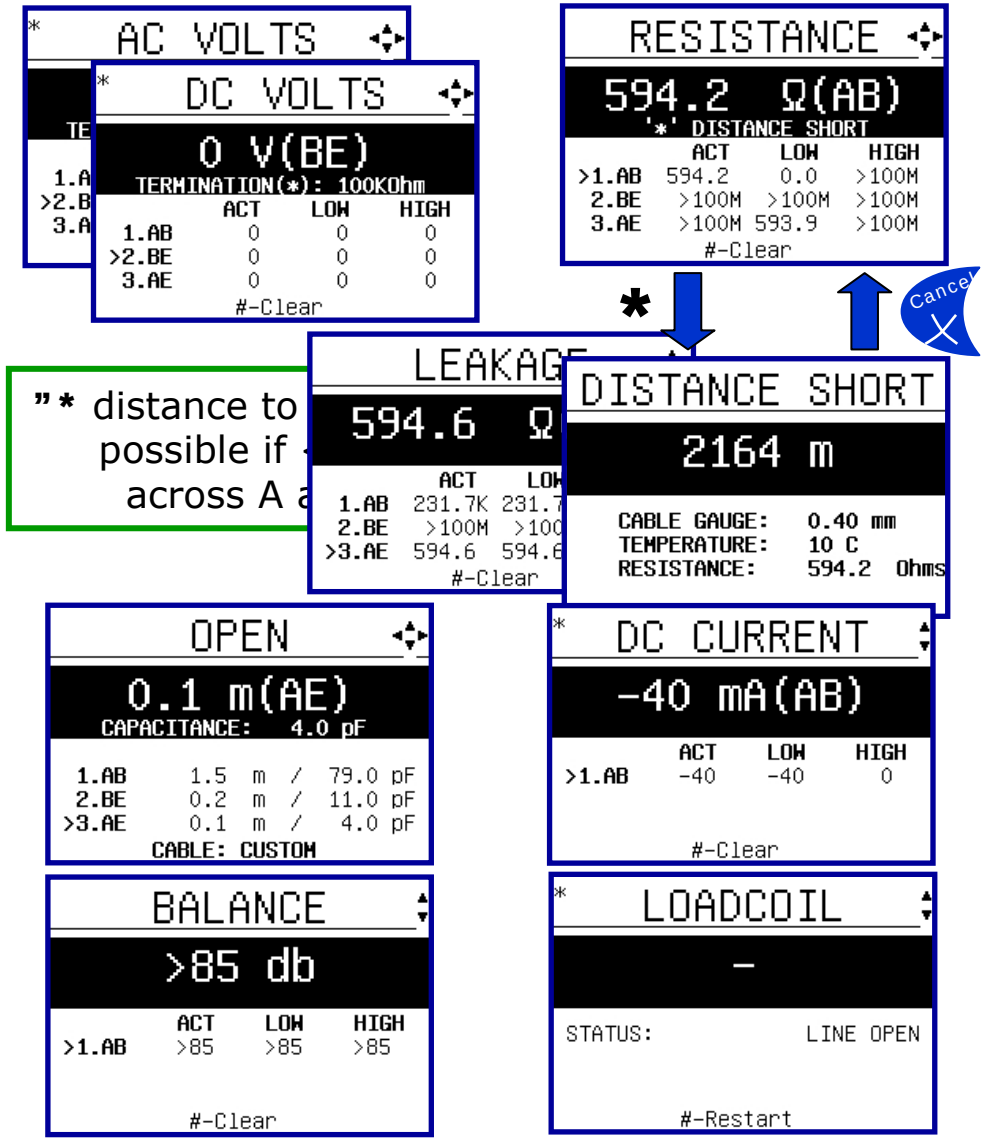
- **AC volts**
- **DC volts, and**
- **Resistance**

across all pairs

MEASURE

COPPER TEST

- 1. CABLE CHECK
- 2. SNAPSHOT
- **3. MEASURE**
- 4. SETUP
- 5. CALIBRATION



SmartClass ADSL

Interpreting Test Results

Measuring AC Voltage

Why do you measure AC volts?

You measure AC volts to:

- **detect the presence of hazardous voltage.**
- **find induced AC current from power lines and other AC sources.**
- **check ringer voltage level.**

AC voltage results on A to B should be 0.0V. A to earth and B to earth should be equal to each other. Anything else indicates AC signal interference and/or an unbalanced line.

Measuring DC Voltage

Why do you measure DC volts?

You measure DC volts to:

- **detect and measure CO/exchange battery current.**
- **detect crossed battery conditions.**

To measure DC volts, remove the line battery and measure tip and ring to ground. It should be < 3.0V; anything else indicates crossed battery that inhibits digital signals.

Measuring Resistance

Why do you measure resistance?

You measure resistance to:

identify shorts, grounds and resistive faults.

Resistance should be measured with the battery disconnected, so that the resistance of the battery itself doesn't affect the measurements.

The typical resistance is >3.5 MOhms. Lower values indicate a short or ground fault.

Measuring Distance to Short

Why do you measure Distance to Short?

You measure resistive distance to:

verify that the cable pair does not exceed resistive loop limits.

Measuring DC Current

Why do you measure DC current?

You measure DC current to:

verify if enough current is present to operate equipment including the phone, caller ID boxes or ISDN NTs.

DC current on tip to ring should be > or = 23mA at the NID.

Anything less will not allow for differences in temperature and phone equipment will not operate during extremes.

NID=Network **I**nterface **D**evice

Measuring Opens (Capacitance)

Why do you measure Opens/Capacitance?

You measure opens to:

- **find total electrical (capacitive) loop length (includes length of bridged taps)**
- **find wet sections, bridged taps or open faults**

Opens/Capacitance: < 3% difference between A and B values indicate an acceptably balanced loop. Anything greater indicates an unbalanced line or open fault, which inhibit digital signals.

You can also compare the distance from the Opens measurement to a resistive distance measurement, and determine the presence of a bridged tap by the difference in the distances.

Measuring Longitudinal Balance

Why do you measure longitudinal balance?

You measure longitudinal balance to:
check if the pair's A and B are electrically the same in their ability to cancel noise.

Will identify noise problems, series faults/bad splices and/or loop quality (bonding and grounding).

- **Single-ended measurement**
- **Doesn't require a termination at the far end**
- **Low frequency signal allows to see cable faults at greater distance**

Longitudinal Balance test requires a proper ground connection!

To check the ground connection:
1. **If the balance result is very good (100dB and above), the ground is likely not to be good**
2. **Disconnect one of the leads (a or b) and measure the balance. If the result is better than 35dB, the ground connection is likely not to be good**

Detecting load coils

Why do you check for load coils?

You check for load coils to:

ensure there are no load coils present on a digital line (such as ADSL or VDSL).

SmartClass can detect up to 5 load coils that may exist on the line.

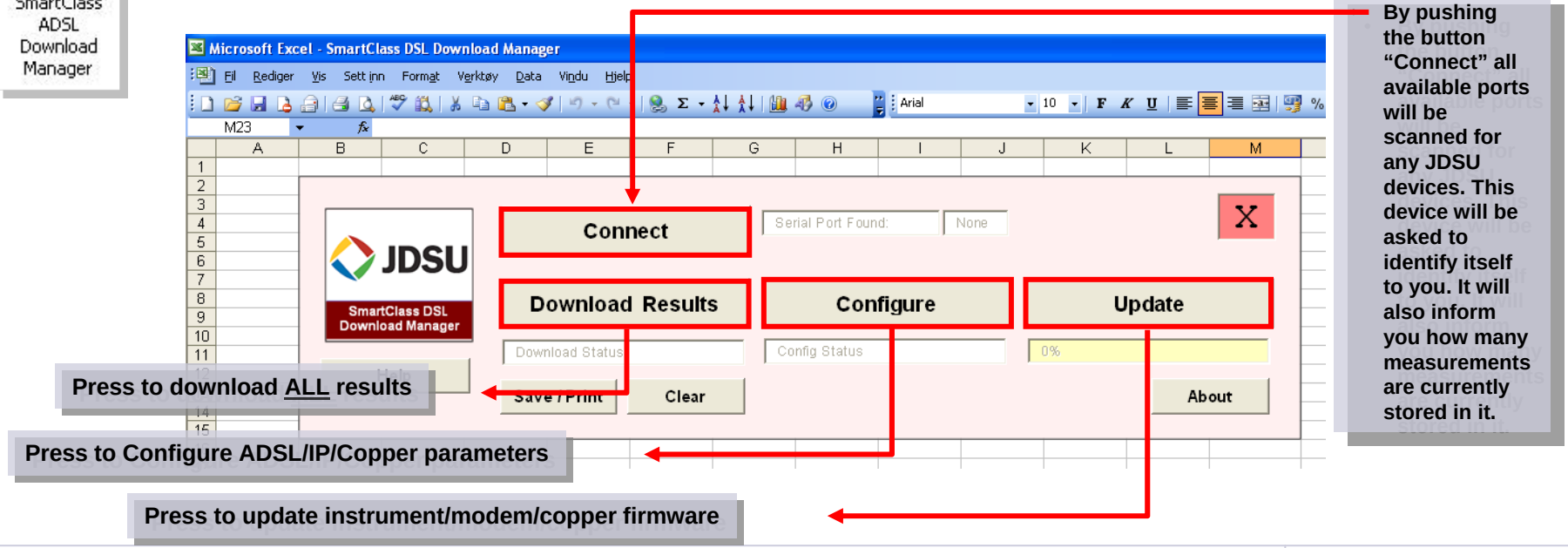
SmartClass ADSL

Documenting Test Results

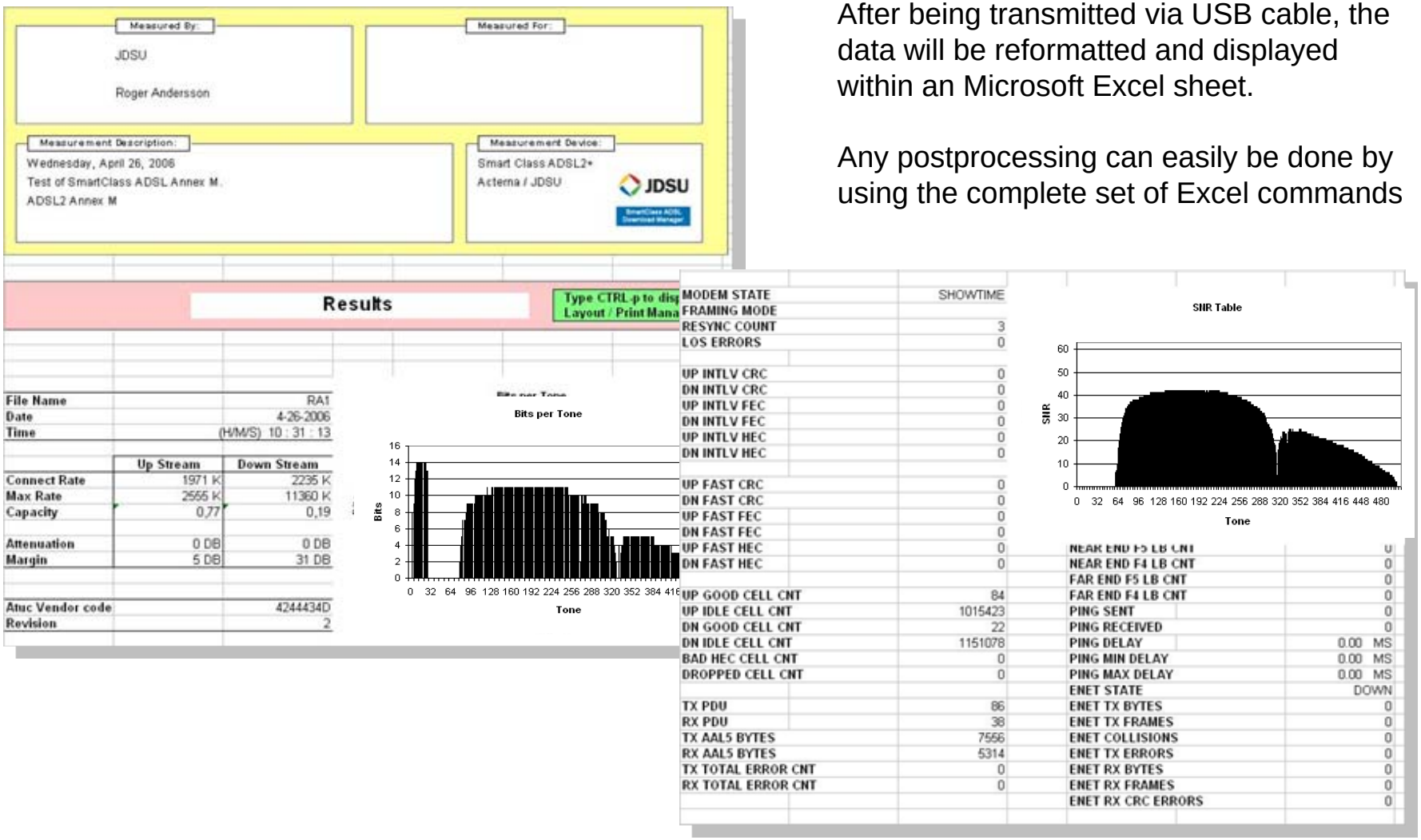
SmartClass ADSL Download Manager

- The **SmartClass ADSL Download Manager** enables you to:
  - copy the measurement data from your Smart Class ADSL tester to your computer
  - update your SmartClass ADSL with new firmware from your computer
- The SmartClass ADSL Download Manager is designed to run on Windows XP and 2000 operating systems, and to run the SmartClass ADSL Download Manager, Excel 2000 or higher must be installed on your computer

- After installation, connect you PC and SmartClass ADSL by means of an USB cable and doubleclick on the desktop icon called **"JDSU SmartClass ADSL Download Manager"**



SmartClass ADSL – Test Report Sample



Measured By:
JDSU
Roger Andersson

Measured For:

Measurement Description:
Wednesday, April 26, 2006
Test of SmartClass ADSL Annex M.
ADSL2 Annex M

Measurement Device:
Smart Class ADSL2+
Actema / JDSU

Results

Type CTRL-p to dis
Layout / Print Mana

File Name		RA1
Date		4-26-2006
Time		(H/M/S) 10 : 31 : 13
	Up Stream	Down Stream
Connect Rate	1971 K	2235 K
Max Rate	2555 K	11360 K
Capacity	0,77	0,19
Attenuation	0 DB	0 DB
Margin	5 DB	31 DB
Atuc Vendor code		4244434D
Revision		2

Bits per Tone

Bits

Tone

MODEM STATE	SHOWTIME
FRAMING MODE	
RESYNC COUNT	3
LOS ERRORS	0
UP INTLV CRC	0
DN INTLV CRC	0
UP INTLV FEC	0
DN INTLV FEC	0
UP INTLV HEC	0
DN INTLV HEC	0
UP FAST CRC	0
DN FAST CRC	0
UP FAST FEC	0
DN FAST FEC	0
UP FAST HEC	0
DN FAST HEC	0
UP GOOD CELL CNT	84
UP IDLE CELL CNT	1015423
DN GOOD CELL CNT	22
DN IDLE CELL CNT	1151078
BAD HEC CELL CNT	0
DROPPED CELL CNT	0
TX PDU	86
RX PDU	38
TX AAL5 BYTES	7556
RX AAL5 BYTES	5314
TX TOTAL ERROR CNT	0
RX TOTAL ERROR CNT	0

SNR Table

SNR

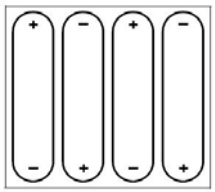
Tone

NEAR END F5 LB CNT	0
NEAR END F4 LB CNT	0
FAR END F5 LB CNT	0
FAR END F4 LB CNT	0
PING SENT	0
PING RECEIVED	0
PING DELAY	0.00 MS
PING MIN DELAY	0.00 MS
PING MAX DELAY	0.00 MS
ENET STATE	DOWN
ENET TX BYTES	0
ENET TX FRAMES	0
ENET COLLISIONS	0
ENET TX ERRORS	0
ENET RX BYTES	0
ENET RX FRAMES	0
ENET RX CRC ERRORS	0

After being transmitted via USB cable, the data will be reformatted and displayed within an Microsoft Excel sheet.

Any postprocessing can easily be done by using the complete set of Excel commands

Maintaining Batteries



General

The SmartClass Tester uses 4 AA batteries. Either alkaline or rechargeable batteries can be used. To prolong the life span of any batteries:

- **Do not mix battery types (do not use Alkaline and rechargeable at the same time)**
- **Do not mix old batteries and new batteries**

Charging

Let the SmartClass charge for 2 to 4 hours. The charging time will be the same whether the power is on or off. The Batt LED is amber when the unit is powered up and the batteries are charging.

Changing the batteries

- **Remove the battery compartment door by pressing down and pushing toward the bottom end**
- **Replace the batteries, with polarities oriented as shown to the left**
- **Replace the battery compartment door**
- **Specify the type of battery you inserted**

If the AC Adapter is connected, you will be prompted for the battery type immediately. If the adapter is not connected, the prompt appears when you power up the unit

SmartClass ADSL - Standard Configurations

Configurations

Part Number	Description
CSC-DSLSIL-P2	SmartClass ADSL 1/2/2+ Silver Package Annex A
CSC-DSLSIL-P2B	SmartClass ADSL 1/2/2+ Silver Package Annex B
CSC-DSLGLD-P3	SmartClass ADSL 1/2/2+ plus DVOM Gold package Annex A
CSC-DSLGLD-P3B	SmartClass ADSL 1/2/2+ plus DVOM Gold package Annex B
SCASWVIDEO	SmartClass ADSL software options for IP Video

Accessories:

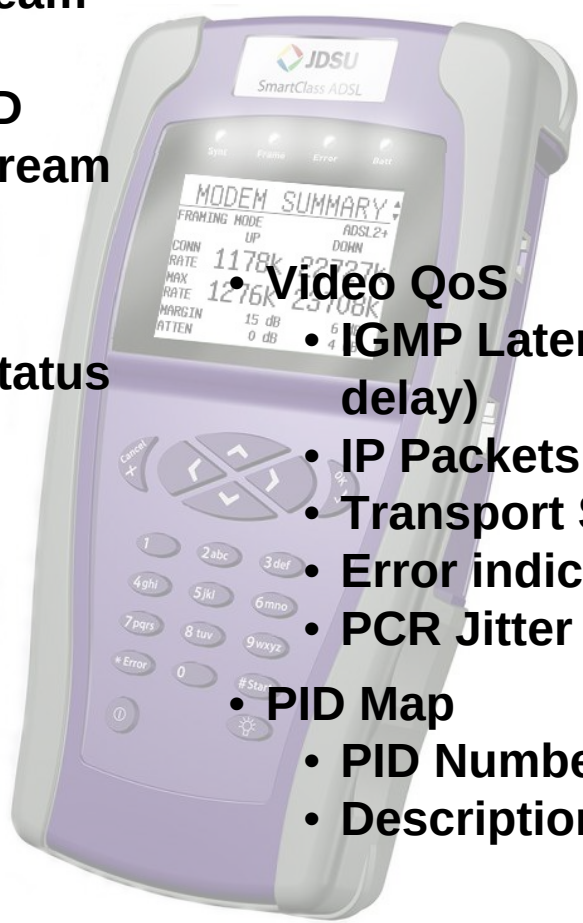
- Test leads
- Carrying Bag
- Universal Power Adapter
- 4 AA Alkaline Batteries
- Ethernet Cable
- RJ11 Phone Cable (for DSL)
- User Guide & PC software on CD ROM

SmartClass ADSL

IPTV Option

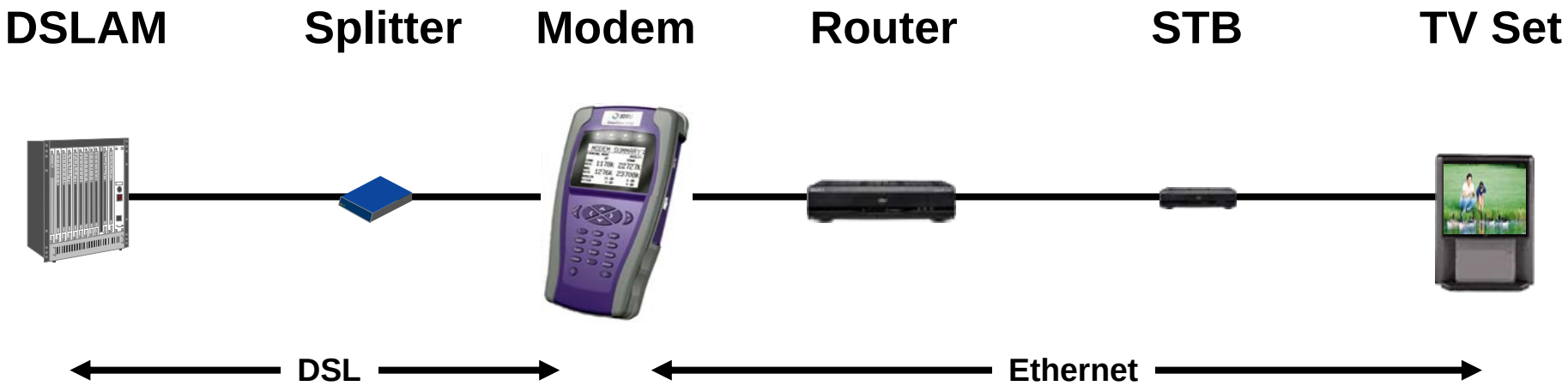
SmartClass ADSL – IPTV Option Features

- Streaming (Set-Top-Box emulation)
  - MPEG-2 Transport Stream Broadcast & VOD
  - ISMA Broadcast & VOD
  - UT Starcom Rolling Stream
- IGMPv2
- Video Results
  - URL and connection status
  - Video Rate
  - Audio and data rates



- Video QoS
  - IGMP Latency (Channel change delay)
  - IP Packets received and jitter
  - Transport Stream Sync errors
  - Error indicator count
  - PCR Jitter
- PID Map
  - PID Number
  - Description

SmartClass IPTV Option – How to connect?

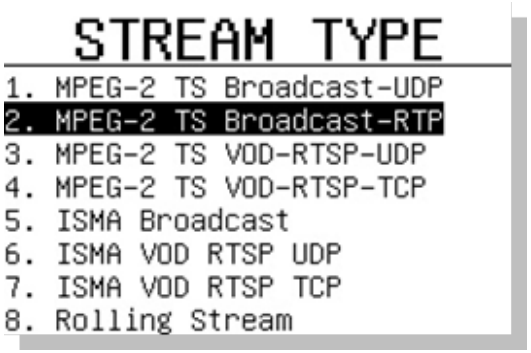


The SmartClass ADSL/IPTV should be connected
as a Golden Modem passing the data through to the

Router ⇨ Set Top Box ⇨ TV

IPTV Option – What to configure?

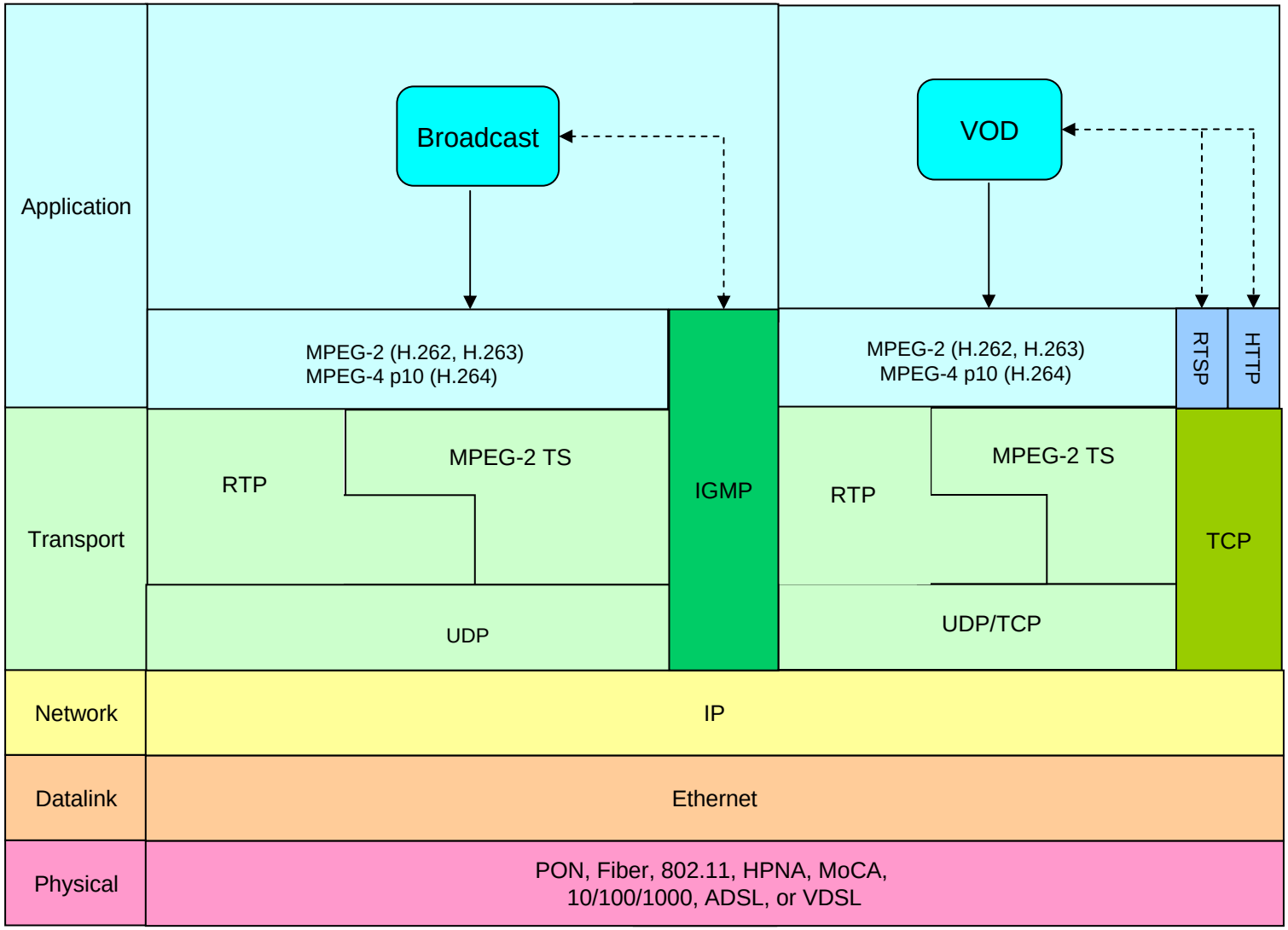
Select MODEM TEST ⇨ SETUP ⇨ ADVANCED ⇨ VIDEO SETUP



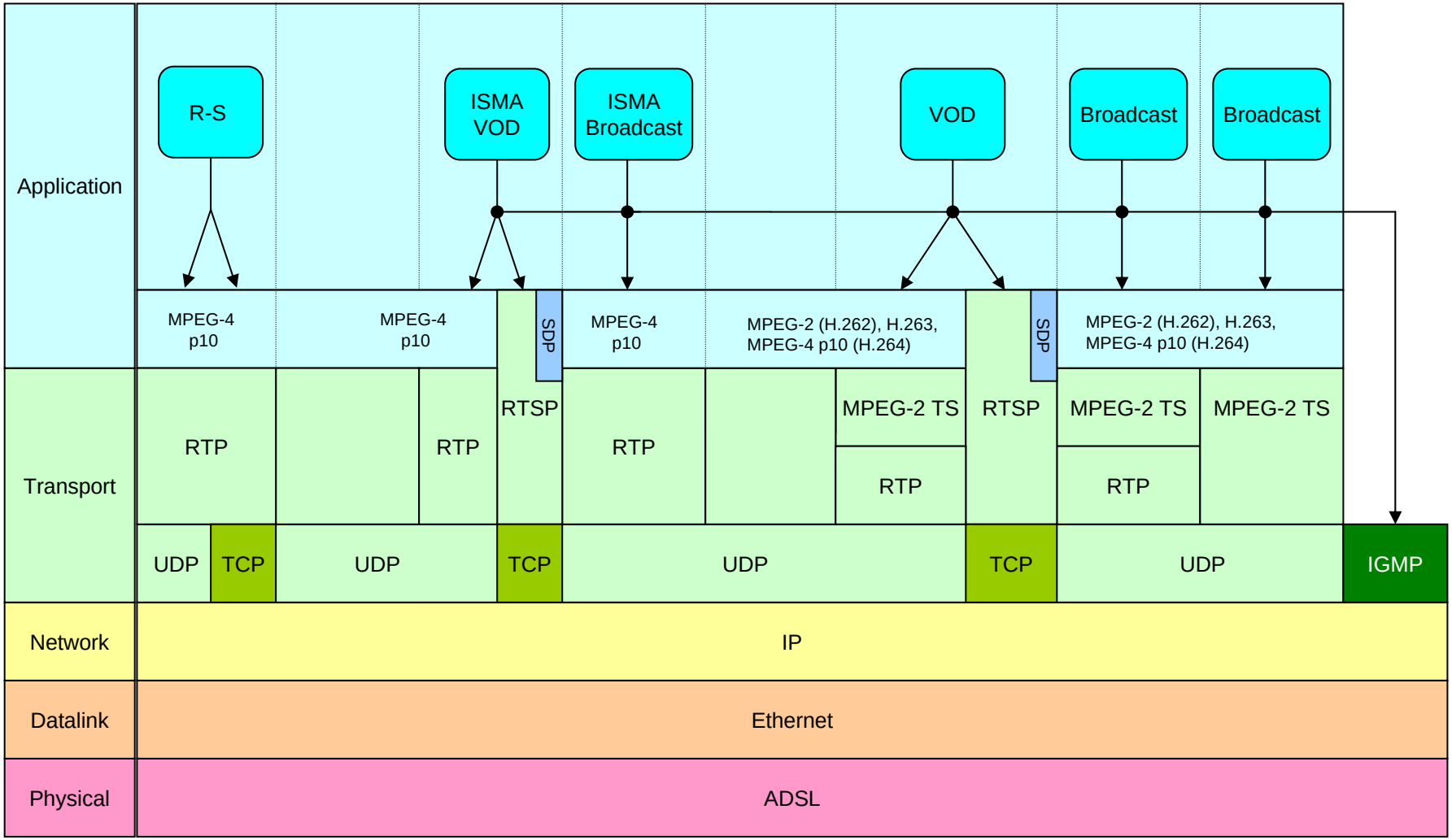
Then select:

- **STREAM TYPE**
  - **MPEG-2 Transport Stream Broadcast UDP**
  - **MPEG-2 Transport Stream Broadcast RTP**
  - **MPEG-2 Transport Stream VOD RTSP UDP**
  - **MPEG-2 Transport Stream VOD RTSP TCP**
  - **ISMA Broadcast**
  - **ISMA VOD RTSP UDP**
  - **ISMA VOD RTSP TCP**
  - **Rolling Stream**
- **IP ADDRESS**
  - **Address of the Multicast IP stream corresponding to the channel you want to analyze**
- **PORT NUMBER**
  - **RTSP Port Number used for the channel you want to analyze**

IPTV Protocol Stacks



SmartClass IPTV Protocol Selections

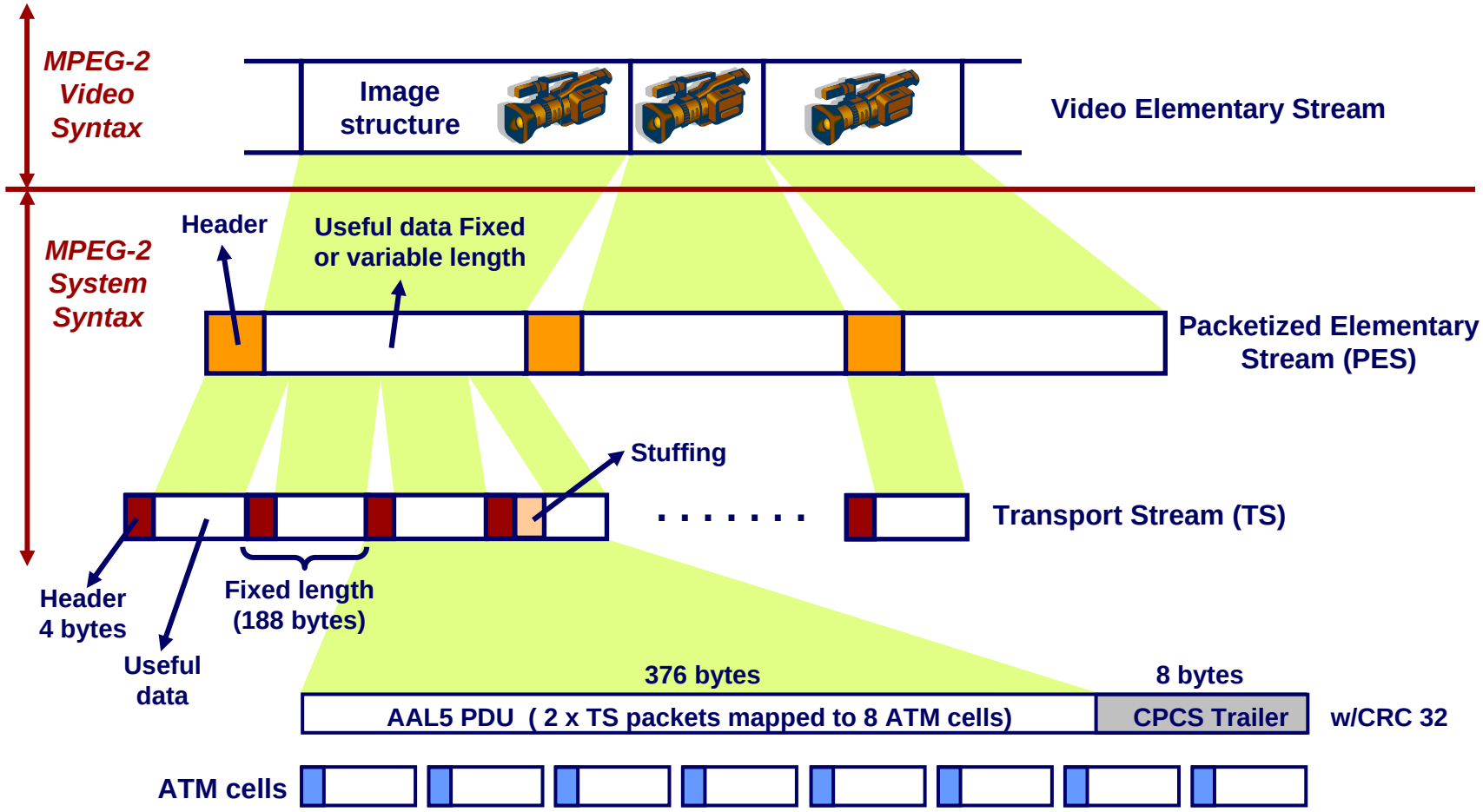


SmartClass ADSL

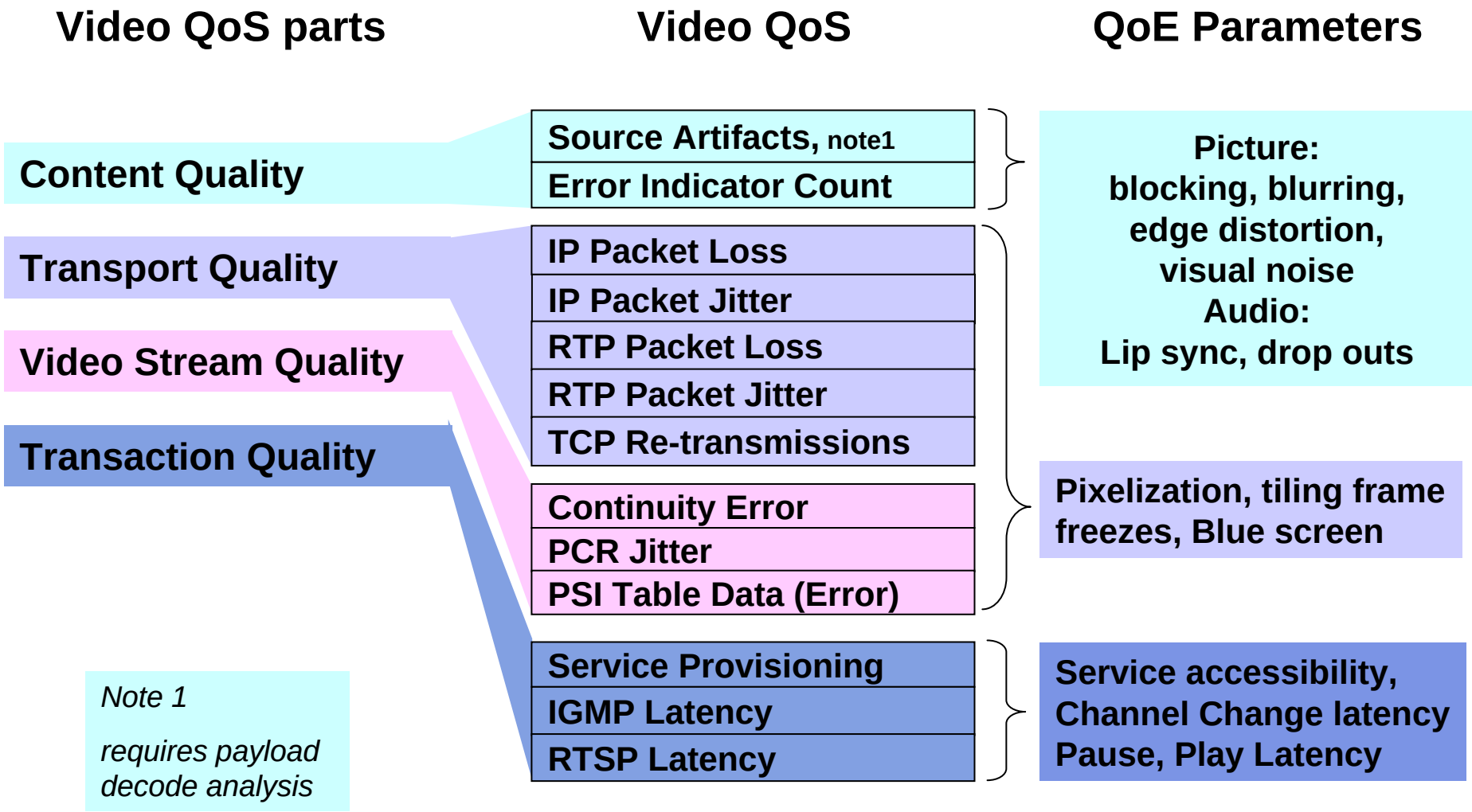
Understanding IPTV Test Parameters

Transport Stream Creation

- Encapsulation of video, audio or private data
- Mapping TS packets to ATM Transport

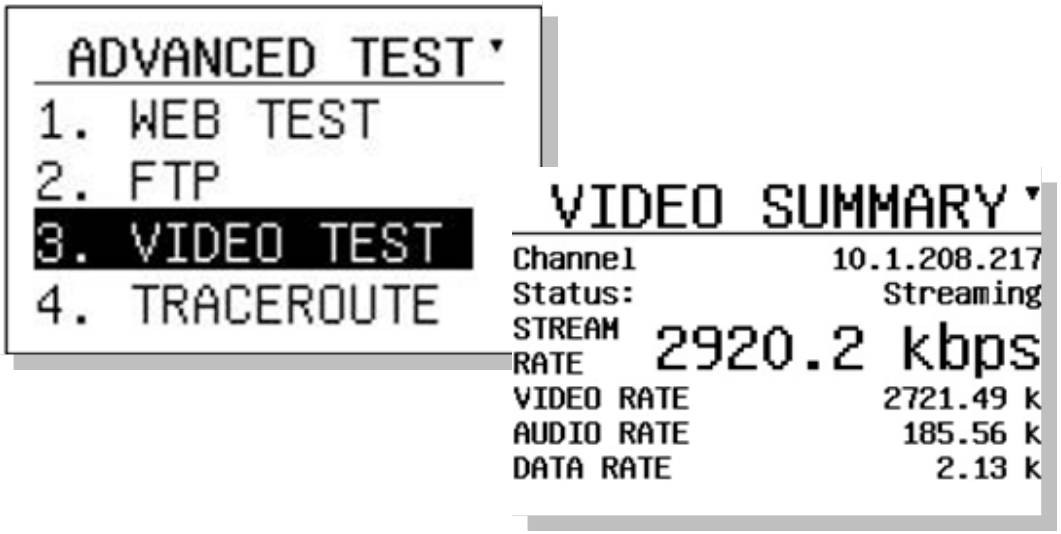


QoS and QoE mapping for Video Services



SmartClass ADSL IPTV Option – Interpreting Test Results

Select MODEM TEST ⇨ MODEM RESULTS ⇨ ADVANCED ⇨ VIDEO TEST



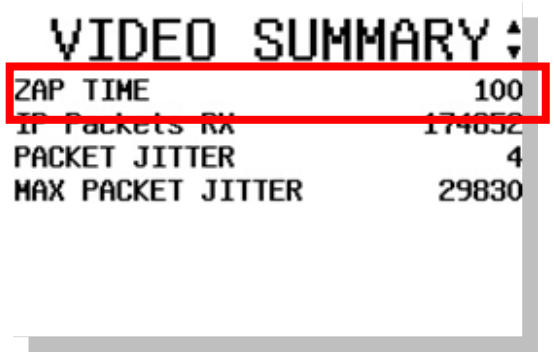
The 1st VIDEO SUMMARY screen shows if the video is streaming, the IP address of the multicast video stream (channel), and the total STREAM RATE, also broken down to VIDEO, AUDIO and DATA portions

SmartClass ADSL IPTV Option – Interpreting Test Results

VIDEO SUMMARY	
ZAP TIME	100
IP Packets RX	174852
PACKET JITTER	4
MAX PACKET JITTER	29830

The 2nd VIDEO SUMMARY screen shows IGMP Latency (ZAP TIME) and IP Packet Statistics

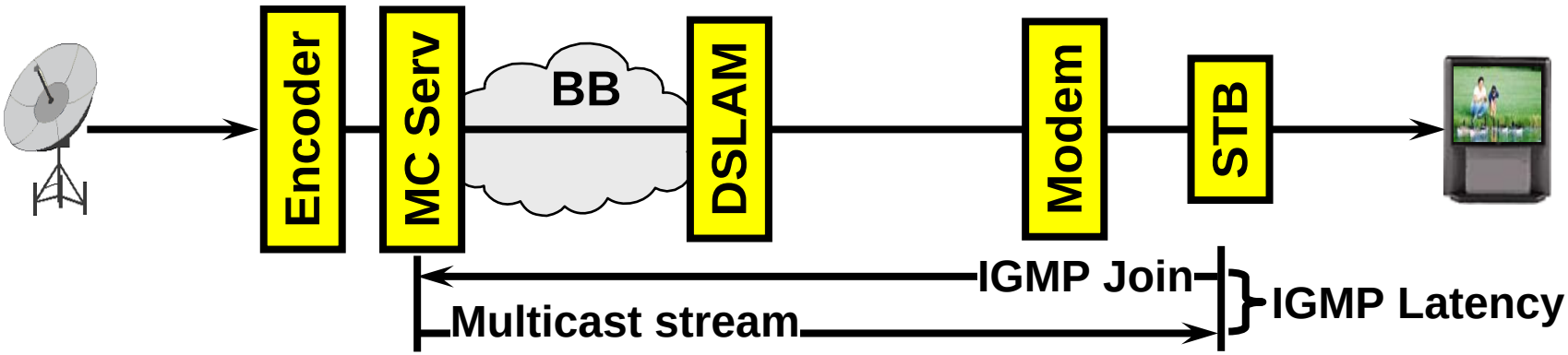
Zap Time and IP Packet Analysis



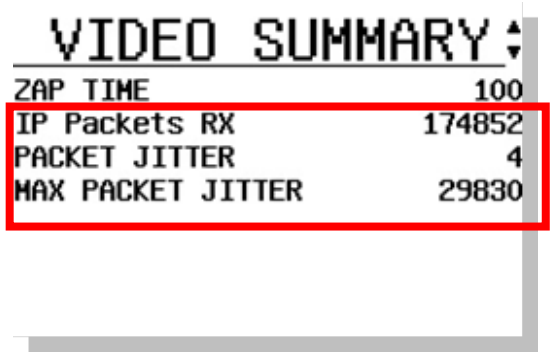
IGMP Latency (ZAP TIME) is the measure of the network components to complete a program change.

For example, in broadcast video, it is the time between the IGMP join message is sent, to the time the first video packet is received

< 500 mS



Zap Time and IP Packet Analysis



Packet statistic parameters are measured at the IP layer:

IP Packets Rx is the number of received IP packets

Packet Jitter - If the overall packet flow experiences excess jitter, due to congestion problems and resulting CoS mechanism performance issues, this jitter can directly causes PCR jitter. If it is excessive enough it could cause decode buffers to run out resulting in gaps in decoder output. Gaps may appear as freeze frame or pixelization events seen on the TV.

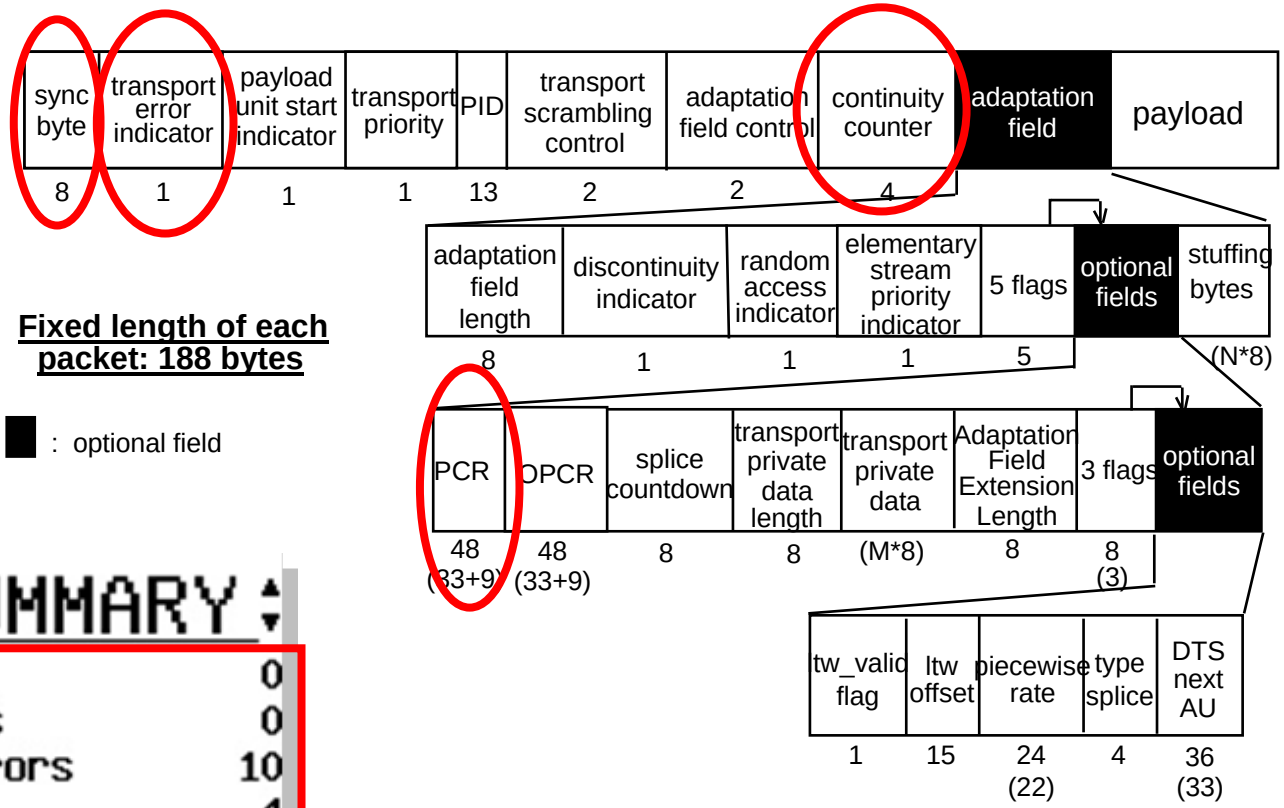
SmartClass ADSL IPTV Option – Interpreting Test Results

VIDEO SUMMARY	
TS Sync Errors	0
TS ErrorInd Errors	0
TS Continutity Errors	10
TS PCR Jitter	4
RTP Lost Packets	56
RTP Oos Packets	0
RTP Errors	0

The 3rd VIDEO SUMMARY screen shows Transport Stream (TS) and RTP error statistics

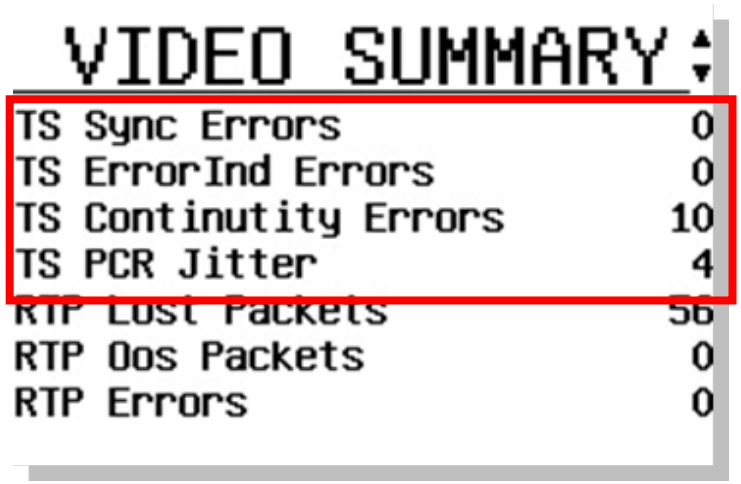
Transport Stream and RTP Analysis

Parameters for basic level MPEG analysis



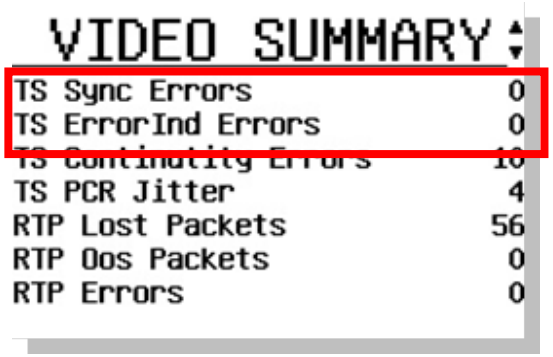
Fixed length of each packet: 188 bytes

■ : optional field



On-line monitoring and analysis of MPEG protocol parameters which essentially determines the quality of video streams.

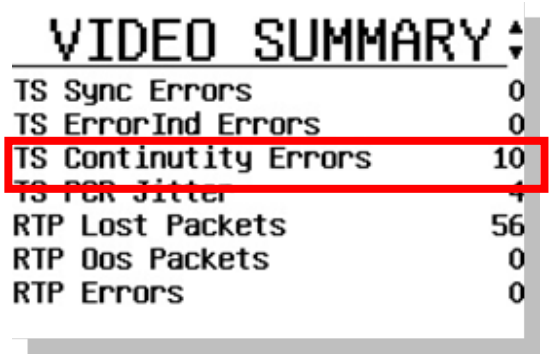
Transport Stream and RTP Analysis



The Transport Stream Sync Errors indicates errors in the sync words

The Transport Stream Error Indicator is a bit set by the encoders in any video packet transmitted where the encoders detects corrupted source content. The presence of packets with this indication is strictly an issue with the content quality and not due to the performance of the distribution network

Transport Stream and RTP Analysis



The Transport Stream Continuity Error (Video Packet Loss) is the analysis of video Transport Stream packets which show the Continuity Error indicator set which = lost packet events

< 0.1%

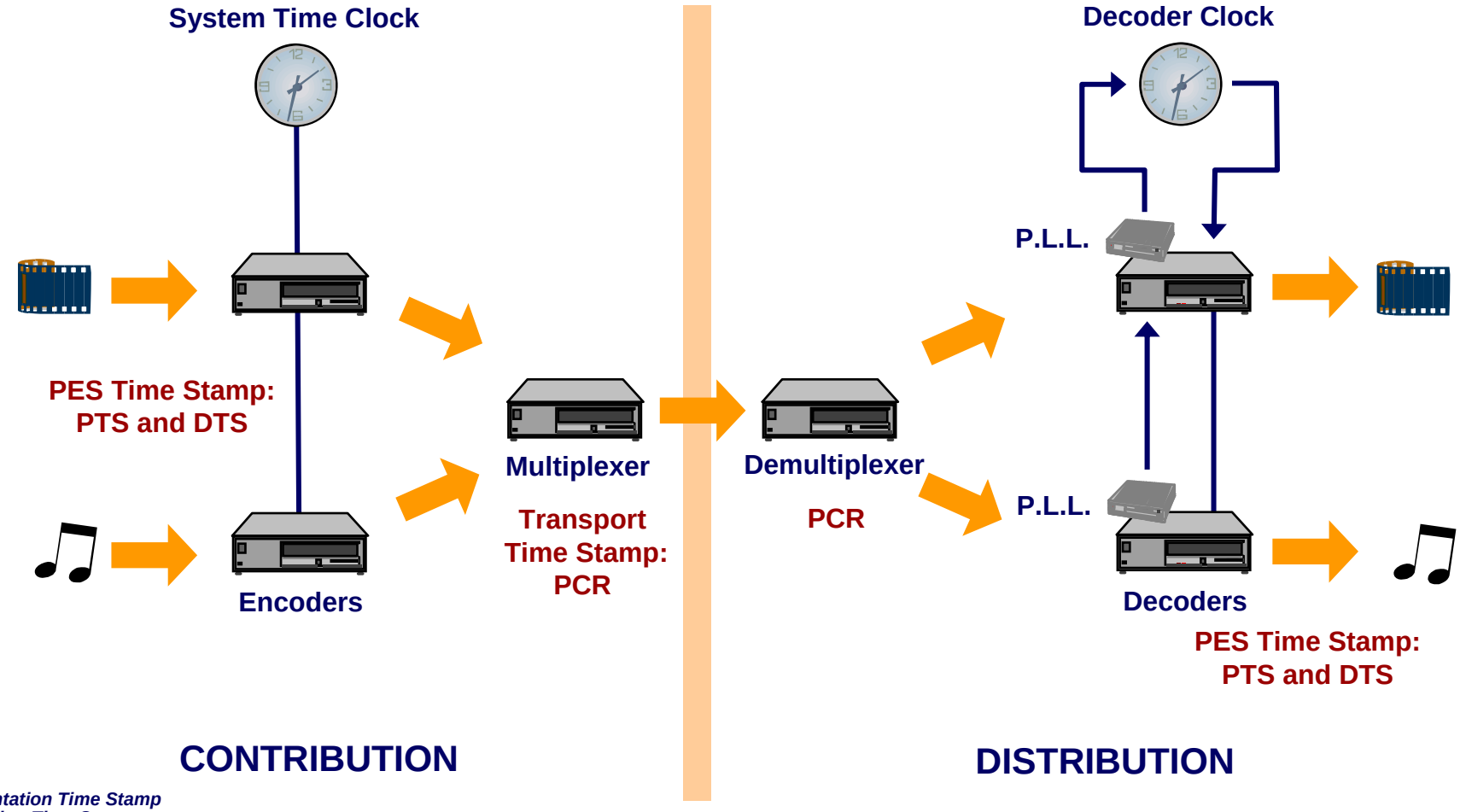
Remark!

Packet loss is measured by analyzing the video packet flows and determining the presence of a continuity error event. Standards define the process, but since each video packet carries a sequence number, continuity errors can definitely be determined

For example, since a MPEG-2 transport packet is 188 bytes in length, an IP frame will carry within it 7 such MPEG-2 Transport packets. Thus, losing 1 IP frame will result in losing 7 MPEG-2 Transport packets. Conversely, if the MPEG-2 Continuity Counter jumped by 7 between 2 consecutive MPEG-2 packets, one can observe with a fair amount of certainty that there was a loss of an IP packet

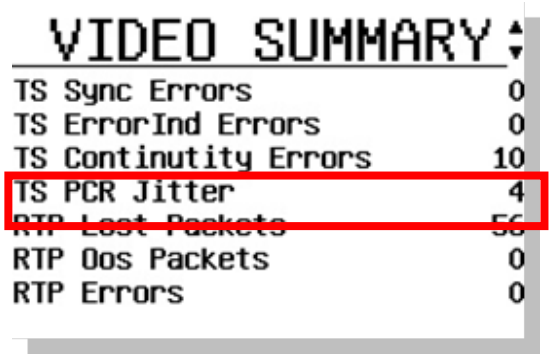
Transport Stream Timing

Time stamping and synchronization of components



PTS – Presentation Time Stamp
DTS – Decoding Time Stamp
PCR – Program Clock Reference

Transport Stream and RTP Analysis



The PCR jitter can be caused by several things, but most likely are:

1) **overall network packet jitter**
2) **transcoding problems in the encoder, or**
3) **local ad insertion issues (that is, issues related to insertion of advertisements)**

The Transport Stream PCR Jitter (Decoder problem) measures this key parameter; if high the decoder can not properly decode the video payload:

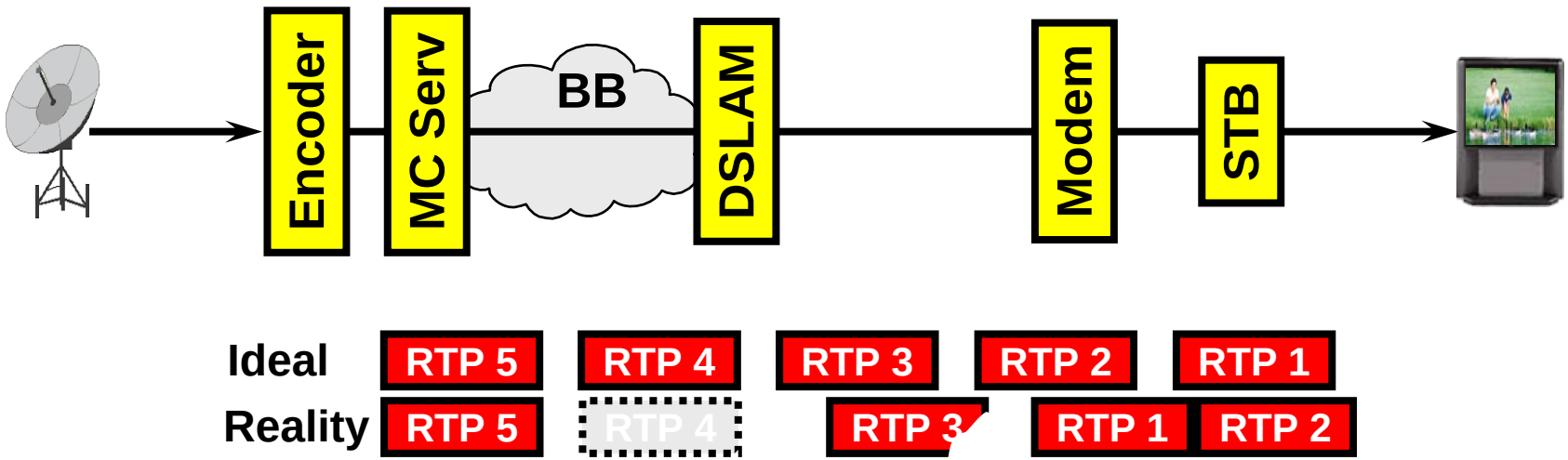
< 10 msec

Transport Stream and RTP Analysis

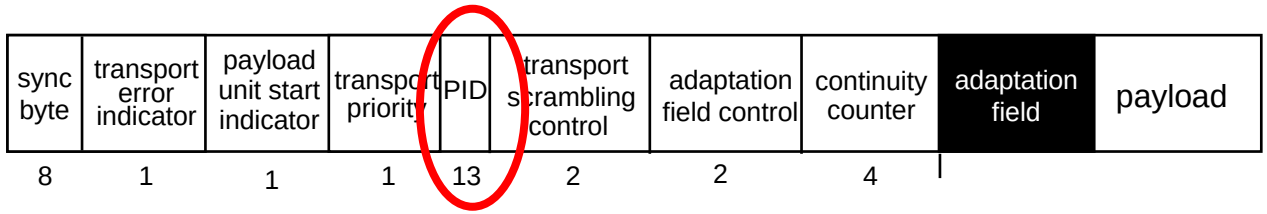
VIDEO SUMMARY	
TS Sync Errors	0
TS ErrorInd Errors	0
TS Continutity Errors	10
TS PCR Jitter	4
RTP Lost Packets	56
RTP Oos Packets	0
RTP Errors	0

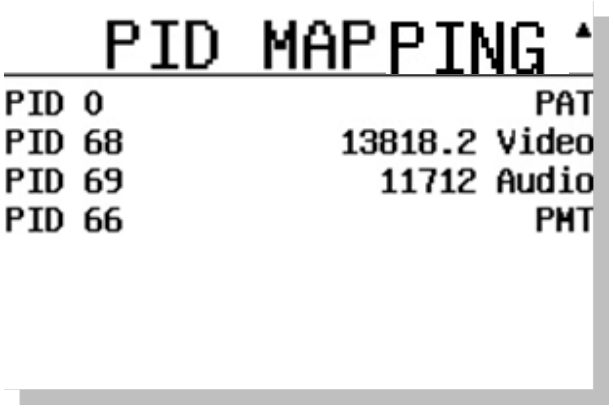
RTP errors are related to the Transport network (Metro Core)

- **RTP Lost Packets: If using broadcast RTP packets (rather than broadcast UDP), this is the number of packets lost.**
- **RTP OOS Packets: Number of RTP packets out of sequence**
- **RTP Errors: Number of RTP packets with errors**



SmartClass ADSL IPTV Option - PID Mapping





For the selected video program stream the PIDs (Packet Identifiers) are shown for each portion: Video, Audio, and Data (PSI table data etc.)

The Type and Description data is decoded from the stream as received. Unknown data includes data not included in the other categories such a Fill/PAD data or data marked as "reserved".

END

Questions???