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OneExpert™ CATV Sweep and Maintenance System

OneExpert CATV ONX-630 & SCU-1800

Maximizing the spectrum efficiency of DOCSIS 3.1® technology requires careful and consistent attention to network maintenance. While the broadband frequency response test in both the forward path (downstream) and the return path (upstream) is a core requirement of any cable network maintenance plan, maintaining cable networks requires more than sweep.

The OneExpert CATV ONX-630 is a powerful meter for maintaining HFC networks, including DOCSIS 3.1 performance analysis, spectrum analyzer, and forward and reverse sweep measurements. The headend/hub rack-mounted SCU-1800 Sweep Control Unit provides downstream sweep to 1.2 GHz and upstream sweep to 204 MHz on up to 16 ports (supports OneExpert CATV ONX-630 sweep).

The ONX-630 works with existing Stealth Digital Analyzer (SDA) rack-mounted sweep gear (SDA-5500 and SDA-5510) located at headend and hub sites. Additionally, OneExpert meters can sweep side-by-side with DSAM-6300 meters. Therefore, major test process/infrastructure modifications are not required when ONX-630s are added to a department's instrument inventory. Moving forward, an advanced sweep transceiver – the SCU-1800 Sweep Control Unit – offers updated, space saving hardware and simple browser configurability.

Viavi Solutions has a long history of integrating the high-level functions and advanced technology necessary for maintaining cable networks with scalable hardware and software platforms. Viavi delivers sweep-meter solutions unequalled in advanced test and measurement performance.



Key Benefits

- Simplifies and speeds testing
- Find root causes quickly, with one simple, quick automated process
- Quick, complete, and simple documentation with StrataSync™
- Improve overall technician efficiency with mobile apps and simplified, one-button testing

Key Features

- DOCSIS 3.1 measurement, OFDM signal analysis, cable modem ranging, registration, and performance testing
- Return sweep up to 204 MHz and forward to 1,218 MHz, compatible with existing SDA/DSAM sweep gear
- DOCSIS in-channel response for return frequency response
- Quick Check, a one-button, fast, multi-point tilt/alignment and power level measurement

Applications

- Ensure optimal performance in new architecture deployment
- Uncover network environmental damage or craft related issues
- Reveal response related issues before impacting entire spectrum
- Optimize performance to shorten time to revenue for new services
- Test return band with higher resolution and non-interference

Fast

Sweep, align, and troubleshoot faster than ever.

- Stealth Sweep™ with integrated tilt/align quickly validates amps and HFC networks faster than any other test.
- Complete a downstream scan including MER/BER in about 60sec.
- AutoChannel™ instantly identifies the channel lineup and eliminates guesswork.

Powerful

Designed to find difficult problems.

- Combined DOCSIS 3.1 and sweep testing validates the complete HFC network.
- Ingress Expert with Hyper Spectrum™ catches difficult return noise problems.
- Expert modes with advanced parallel processing find hidden problems and root causes.
- 40+ years of trusted CATV testing knowledge integrated into one simple device.

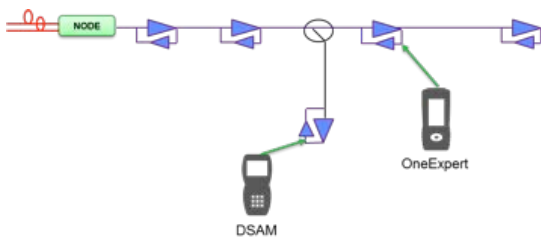
Flexible

Ready for your changing network needs.

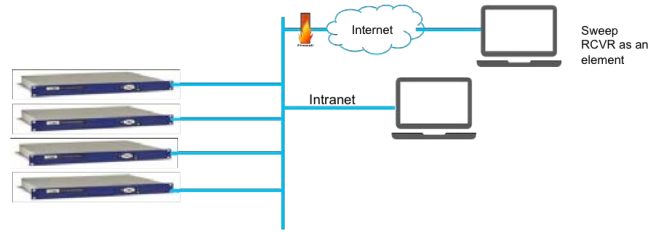
- The ONX-630's dual diplexer 42/85 or 65/204 with 1.2GHz supports next generation networks.
- A companion fiber scope and power meter support FTTx and fiber deep networks.
- Test gigabit service over DOCSIS, Ethernet, and WiFi.
- The ONX-630 is compatible with DSAM-6300 and SDA-55XX providing seamless transition.
- Common sweep reporting for ONX-630 and DSAM ensures consistency via StrataSync.

Sweep Testing

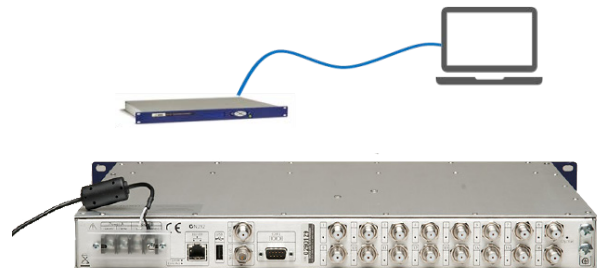
The OneExpert ONX-630 is backward compatible with SDA-5500 & SDA-5510 sweep transmitters, enabling smooth migration to OneExpert sweep and DOCSIS 3.1 performance analysis capability.



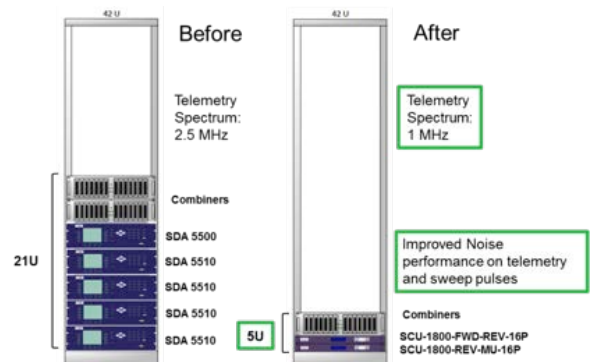
The sweep can be easily configured remotely via HTTP interface to the SCU:



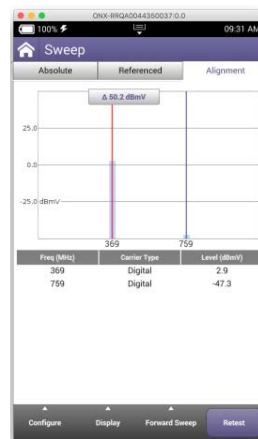
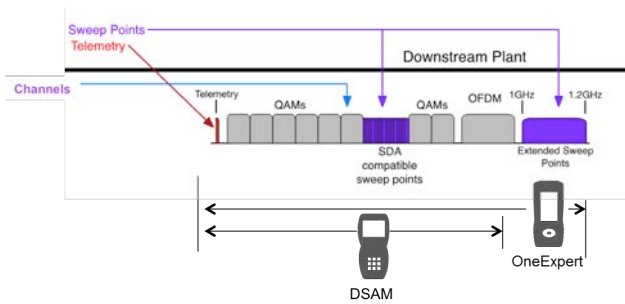
Or the sweep can be configured locally with a direct connection to a laptop:



The 16 input ports on the SCU-1800 offer improved performance with less combining, an improved noise floor, lower costs, and reduced rack space through consolidation of sweep receivers.



Rack Space Conservation Example – One 1U SCU-1800 with 16 return sweep test ports can take over the duties of multiple 3U SDAs that have only one return sweep test port. While this is a considerable reduction in costly headend/hub rack space, even more space is saved in that fewer return test point combining networks are required. The new system not only reduces rack space and power consumption, but also reduces spectrum consumed by telemetry as only one telemetry signal will be required for the SCU vs a separate telemetry signal for each of multiple SDAs.



Alignment mode provides a quick view of tilt carriers

Sweep Beyond 1 GHz

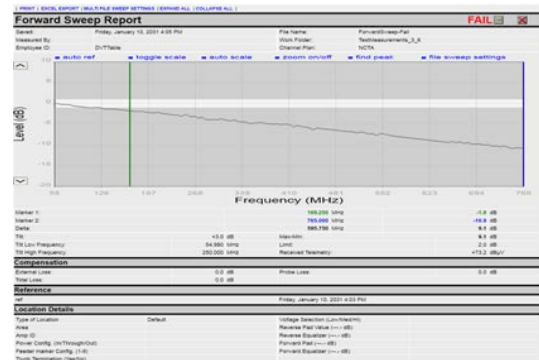
The OneExpert CATV ONX-630 coupled with new SCU unit can provide sweep to 1.2GHz. DSAMs operating on the same network are still compatible up to 1GHz. The touch-screen sweep display is easily toggled from portrait to landscape mode. The technician can toggle from absolute level mode to referenced sweep mode, to the alignment mode for quick view of tilt carriers.

Sweepless Sweep™

Ideal for sweep testing in distributed access architecture networks, the Sweepless Sweep mode references existing carriers to provide a normalized sweep response for alignment and troubleshooting.

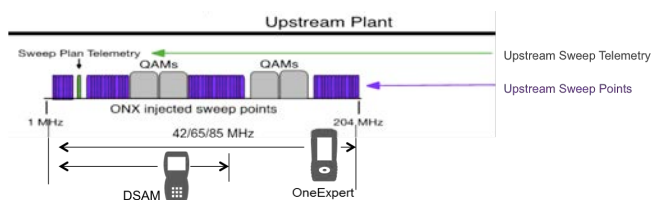


Document Results in StrataSync



Reverse Sweep/Alignment to 204 MHz

OneExpert's flexible design allows sweeping on existing infrastructure or expanded return bands up to 204MHz (or anywhere in between).



Reverse alignment mode displays levels of signals injected by the meter as they are received by the SCU in the headend/hub. The technician can toggle from absolute level mode to referenced sweep mode, to alignment mode for quick view of tilt carriers.

Utilize the same sweep reporting tool in StrataSync for both DSAM and ONX-630. You have the same flexibility, capability, and user interface. You can mix and match reports done from DSAM and ONX-630 for sweep reports. StrataSync makes syncing and managing data simple.

Keeping track of test equipment inventory is typically a challenge for field operation groups. Asset management includes types of instruments, firmware versions, options, and automated test configurations that match standardized methods and procedures. The challenge increases every time a change occurs. Without a means to efficiently collect and analyze test data, valuable information about network health is missed.

StrataSync	What It Does	Why It Is Needed
Asset management	Manages and tracks test instruments by displaying assets, modules, versions, and locations. Maintains accurate instrument configuration and setup. Provides visibility into instrument usage.	Eliminate time wasted on instrument setup. Reduce repeats with correctly configured instruments. Improve results and reduce operating costs.
Data-result management	Collects and analyzes results with centralized collection and storage secure visibility from anywhere, and consolidated test data/metrics.	Access more data with centrally collected results for better use. Speed problem resolution by sharing data for faster troubleshooting. Drive compliance by tracking and comparing technician performance.
Updates the workforce	Informs and trains the workforce through alerts, release notes and manuals, and a comprehensive product knowledge library.	Inform the workforce using a single source for instrument status new capabilities, and educational content. Improve performance with quick access to training and troubleshooting information. Stay current with alerts for expiring warranties and overdue calibrations.
StrataSync	Cloud-based solution manages Viavi instrument assets and field data results.	Plug-and-play back-office integration.

StrataSync is a cloud-based, hosted solution that manages assets, configurations, and test data for Viavi instruments to ensure they are all equipped with the latest software and installed options. It manages inventory, test results, and performance data from anywhere with browser-based ease—improving both technician and instrument efficiency. Operators can then leverage data from the entire network for results analysis and to inform and train the workforce.

Channel Expert and DOCSIS Expert

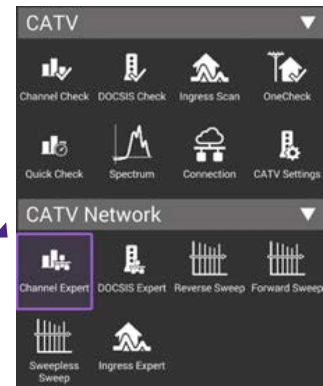
The Expert modes enable a maintenance tech to enter a live test mode with particular location parameters compensating measurement results according to a specified location's characteristics. Particular location parameters are easily configured in StrataSync and stored in the meter.

When problems arise that require live, real-time troubleshooting, Channel Expert provides a powerful suite of tests that help track down tough intermittent issues without requiring a technician to have years of field experience.

Channel Expert automatically performs an extensive set of measurements and analysis to help technicians quickly identify the root cause, if the problem is something they should fix, or if it requires escalation.

With OneExpert, DOCSIS 3.1 testing is very intuitive. DOCSIS Expert automatically identifies and locks on the 32 bonded QAM signals and the OFDM signals, so operation and results analysis is very similar to DOCSIS 3.0. Testing only the physical layer is inadequate to effectively analyze DOCSIS 3.1 performance. OneExpert uses a DOCSIS 3.1 chip set to test the service layer, enabling IP-related tests including throughput, codeword errors, and profile analysis.

HFC Network test modes for plant maintenance and troubleshooting.



Three Year Warranty

The standard warranty includes:

- All parts and labor necessary to return an instrument to full performance specifications
- Authorized Viavi repair processes performed by Viavi factory-trained engineers and technicians
- Genuine Viavi parts
- All relevant engineering changes and firmware upgrades
- Thorough performance testing, adjustment, and verification post-repair



OneExpert ONX-630 Specifications

Frequency	
Range	0.5 to 1,218 MHz
Accuracy	±10 ppm typical @25°C
Downstream Analysis - Port 1	
Max input power	60 dBmV total integrated power
Operation on powered TAP	Operate with up to 90 V AC/DC on input port
Power Detection/notification	Notify of AC/DC power presence on port 1 above 2 Volts
Return Loss	>9dB
AutoChannel plan builder	Auto detection of channels (analog, digital, QAM, OFDM)
Upstream Analysis — Port 2	
Ingress spectrum scan	0.5 – 204 MHz, calibrated range 4-204MHz
Sensitivity	–45 dBmV
RBW	300 kHz
Min detectable level upstream	–55 dBmV
Dynamic range	50 dB
Max total integrated power	55 dBmV, 4 –10 MHz, 60 dBmV, 10 to 204 MHz
Accuracy	±2 dB typical at 25°C
Sampling Rate	Hyper Spectrum™ FFT Gapless technology - no missed samples , spans 0.5- 110MHz , 110 to 160 MHz, and 160 to 204 MHz
Return Loss	>9.5dB
Operation on powered TAP	Operate with up to 90 V AC/DC on input port
Power Detection/notification	Notify of AC/DC power presence on port 2 above 2 Volts
Analog Channel Measurement	
Video and audio levels (dual)	
Standards	NTSC , PAL, SECAM
Min detectable signal	–50 dBmV (single channel)
Level accuracy	±1.5 dB from –20 dBmV to +50 dBmV typical at 25°C; ±2.0 dB, –20°C to +50°C
RBW	300 kHz

Downstream Digital Channel Analysis	
Calibrated Power Levels	-20dBmV to +50dBmV
Level accuracy	±1.5 dB from -20 dBmV to +50 dBmV typical at 25°C; ±2.0 dB, -20°C to +50°C
Modulation(s)	64, 128, and 256 QAM, OFDM
Annex A: 5.057 to 6.952 MSPS for 64, 128, and 256 QAM, Annex B: 5.057 MSPS for 64 QAM and 5.361 MSPS for 256 QAM Annex C: 5.274 MSPS for 64 QAM, and 5.361 MSPS for 256 QAM	
Regional demods	DVB-C
Full span MER	
Ingress under carrier — full span ingress noise trace	
Group delay and in-channel response (ICR)	
Digital quality index (DQI) over time	
Errored/severely errored seconds	
Level, measured symbol rate, carrier frequency, modulation, interleaver depth	

OFDM Signal Performance Metrics	
OFDM Channels	24-192 MHz wide - up to 3 active OFDM channels
Level — max, min, average, standard deviation	relative to a 6MHz carrier per CableLabs®
MER — max, min, average, standard deviation, percentile	16 to 44 dB
MER channel band graph	max, min, avg across entire OFDM carrier
Noise — max	
Echo — dBc	
ICFR	in-carrier frequency response (dB)
Spectrum/IUC	spectrum display, including carrier and ingress under carrier

Scan
OFDM signal identified

Profile Analysis
Profiles A, B, C, D, NCP, and PLC (more profiles as implemented)
Lock status, codeword errors (corrected and uncorrected)

MER	
Specified range* -5 to +20 dBmV	21 to 40 dB, 64 QAM; 28 to 40 dB, 256 QAM; 16 to 44 dB, OFDM
Max displayable range	50 dB
Resolution	0.1 dB
Accuracy	±2 dB typical at 25°C
Minimum lock level	-15 dBmV
BER — ChannelCheck and DOCSISCheck mode	Down to 1E-9 (pre and post FEC)
BER — OneCheck mode	Down to 1E-8 (pre and post FEC) Std. 1E-9 user selectable
Interleaver depth	128, 8 max

* MER range declines as input levels decrease. Expected MER range at MIN LOCK level of -15 dBmV is >30 dB MER.

Display/Interface/Usability	
High-brightness color LCD (800 x 480)	
Touch screen	Capacitive
Hard key navigation capable	
Boot time	Approximately 20 sec
Environmental	
For indoor/outdoor use	IP 54 light rain (0.5"/hr, 1.27cm/hr)
Pollution	2°
Drop	1 m (3.3 ft) onto concrete
Temp range	
Operating	-10 to 50°C (14 to 122°F)
Storage temp	-20 to 60°C (-4 to 140°F)
Humidity	10 – 90% RH non-condensing
RF immunity	8.5 V/m (for CATV measurements)
Maximum altitude	4000 m (13,123 ft)
Input/Outputs	
RF (2)	F connectors replaceable
Port 1	Downstream 54/85/108/258 MHz depending on diplexer
Port 2	Upstream 0.5 – 204 MHz and TDR
USB host (2)	
Ethernet (2)	RJ45 10/100/1000T
Power	Polarized
Diplexer Frequencies (Port 1)	
Diplexer return path options (may not be available on all units):	
42 MHz: upstream 4 – 42 MHz; downstream 54 – 1,004 MHz	
65 MHz: upstream 4 - 65MHz, Downstream 85-1,218 MHz	
85 MHz: upstream 4 – 85 MHz; downstream 108 – 1,218 MHz	ONX-630 or Model Dependent
85 MHz: upstream 4 – 85 MHz; downstream 108 – 1,004 MHz	Model Dependent
204 MHz: upstream 4-204 MHz; downstream 258-1,218 MHz	
MoCA filter	All models have MoCA triplexer to filter out MoCA signals below the highest downstream frequency.
Forward Sweep	
Telemetry frequency	Diplexer dependent 50-1,218 MHz
Input Port	Port 1
Compatibility	SCU-1800 or SDA-5500 in SDA Compatibility Mode
Reverse Sweep	
Output Transmit Port	Port 1 or Port 2 (user selectable)
Port 1 Sweep Frequency Range	Diplexer dependent 5-42/5-65/5-85/5-204 MHz
Port 2 Sweep Frequency Range	5-204MHz

Asset and Data Management

StrataSync™

StrataSync™ Reporting Capability

Session based (job/work order) file saving of results gathered at TAP, GB, and CPE

Measurement screen capture save and recall	
StrataSync Core	

Battery

ONX-630	96 W/hr 10.4 V; 10-cell Lilon
Typical battery life	6 – 8 hr continuous; 15 – 20 hr typical usage
Battery charge time	4 Hrs (90%) 6 –8 hrs 100% (AC charger)

Warranty

see www.viavisolutions.com for specific warranty terms

Mainframe and Module	The OneExpert standard three-year warranty includes: <ul style="list-style-type: none">• All parts and labor necessary to return an instrument to full performance specifications• Authorized Viavi repair processes performed by Viavi factory-trained engineers and technicians• Genuine Viavi parts• All relevant engineering changes and firmware upgrades• Thorough performance testing, adjustment, and calibration post repair
Accessories and Battery	One-year warranty

Weight

ONX-630	5.95 lb (2.7 kg)
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Standard Accessories

- Protective case with hand strap and detachable shoulder strap
- AC power supply with choice of country-specific adaptor plug
- Quick start guide
- StrataSync Core support

Optional Accessories

Deluxe accessory kit	Large carrying case, 12 V DC automobile power supply, stand hook, Ethernet cable, hand strap
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SCU-1800 Specifications

Output Transmit Port 1	1 F-Type Connector
Output port impedance	75 Ω
Input ports	16 (F-type connector) with activity indicator
Input port impedance	75 Ω
Port-to-port isolation	>65 dB
Telemetry	
Frequency Range	42 to 1,218 MHz
Frequency Resolution	10 kHz
Modulation	\pm 100 kHz deviation; 65 kbps
Output Level	+20 to +50 dBmV, 1 dB resolution, 0.5dB accuracy typical, 1 dB accuracy over temp
Spectral Purity	50 dBc harmonics and spurious; recommend 1 MHz space from SC QAM edge

Forward Sweep	
Outputs	1 Transmit port
Up to 500 sweep points	User defined sweep plan can utilize injected sweep pulses and/or field instrument reference of active carriers
Supported Sweep Plan Active Carrier types (for reference and measurement by the field instrument)	Analog (NTSC, PALB, PAL GH, PAL I, PAL DK,) Digital (6 or 8MHz), OFDM (24-192MHz),
Compatibility	ONX-630, DSAM-6300 and SDA-5000 in SDA Sweep Mode ONX-630 model/diplexer dependent 50-1218MHz DSAM-6300 50-1000MHz SDA-5000 42-1000MHz
Sweep Pulse	
Frequency Range	42 to 1,218 MHz
Bandwidth	<5 kHz @ 3dB BW; <50 kHz @ 50 dB BW
Frequency Resolution	10 kHz
Level	+20 to +50 dBmV, 1 dB resolution, 0.5dB accuracy typical, 1 dB accuracy over temp
Spectral Purity	50 dBc harmonics and spurious; recommend 1 MHz space from SC QAM edge

Reverse Sweep	
Inputs	16 isolated inputs. Port 1 is standard on all units. Ports 2-16 are optionally enabled and are Auto-Scan for all 16 ports.
Frequency Range	5 to 204 MHz
Compatibility	Compatible with ONX-630, DSAM-6300 and SDA 5000
ONX-630	Single port mode - Diplex dependent 4-42, 4-65, 4-85, 4-204 MHz Dual port sweep - Port 2, 4-204 MHz
DSAM-6300	Model/Diplexer limited, 4-42 MHz, 4-65 MHz, 4-85 MHz
SDA-5000	4-204MHz
Recommended input level	0 dBmV
Input range and accuracy	± 20 dBmV allowable input range; ± 0.75 dB typical; ± 2 dB over temp
Minimum Signal-to-Noise Ratio	20 dB signal-to-noise ratio required on received reverse telemetry from field meters

General	
Enclosure	19-inch (48.3 cm) 1-RU rack mount
Width	19 Inches (48.3 cm)
Depth	14.6 Inches (37.1 cm)
Height	1 RU, 1.74 Inches (4.4 cm)
Weight	785 pounds (3.56 kg)
Power	Dual -48 V DC (-46 to 50 V DC) - AC adapter included
Display	2x16 character backlit
Ethernet	10/100 Mbps
USB	1 USB 2.0
Data storage	1 GB flash memory

Environmental	
For indoor use	
Temp range	
Operating	5 to 45°C
Storage temp	-20 to 60°C
Drop and Vibration	Bench Handling - MIL-STD-810F
Humidity	10 – 90% RH non-condensing
RF immunity	8.5 V/m
Maximum altitude	4000 m (13,123 ft)
Pollution	2°

Ordering Information, OneExpert ONX-630

Model	Diplexers	Part Number
NTX	42/85 MHz; 1.0G/1.2G	ONX-630D31-4285-1012-NTX
	65/204 MHz; 1.2G/1.2G	ONX-630D31-6520-1212-NTX
SWX	42/85 MHz; 1.0G/1.2G	ONX-630D31-4285-1012-SWX
	65/204 MHz; 1.2G/1.2G	ONX-630D31-6520-1212-SWX
Model	Software Option	Part Number
NTX	Forward Sweep	ONX-CATV-SW-FWD-SWEEP ¹
NTX	Reverse Sweep	ONX-CATV-SW-REV-SWEEP ¹
NTX	Reverse Alignment	ONX-CATV-SW-REV-ALIGN ¹
NTX & SWX	IP Video	ONX-CATV-SW-IPVIDEO
NTX & SWX	MOS for VoIP	ONX-MOS
NTX & SWX	TrueSpeed	ONX-TRUESPEED
Model	Accessories	Part Number
NTX & SWX	Accessory Kit with Large Case, Strand Hook, 12V Auto Charger, Ethernet cable	ONX-CATV-DLX-ACCY-KIT
NTX & SWX	MP-80 USB optical power meter	MP-80A
NTX & SWX	MP-60 USB optical power meter	MP-60A
NTX & SWX	P5000i USB fiber scope	FBP-P5000I
NTX & SWX	WiFi Advisor standard package	WFED-300AC
NTX & SWX	WiFi Advisor test device, carrying case, USB cable, AC power supply, and power cord	WFED300AC-1PC
Model	Warranty Extensions	Part Number
NTX & SWX	Five-year warranty	BRONZE-5
NTX & SWX	One calibration	SILVER-3
NTX & SWX	Five-year warranty and two calibrations	SILVER-5

¹ Standard on SWX

Ordering Information, SCU-1800 Sweep Control Unit

Package	Description	Part Number
FWD & REV	SCU-1800, 1.218 GHz Forward and Single User 204 MHz Reverse, 1 Active Reverse port	SCU-1800-FWD-REV-1P
	SCU-1800, 1.218 GHz Forward and Single User 204 MHz Reverse, 16 Active Reverse ports	SCU-1800-FWD-REV-16P
Reverse Only	SCU-1800, 204 MHz Reverse, Multi-User, 1 port	SCU-1800-REV-MU-1P
	SCU-1800, 204 MHz Reverse, Multi-User, 16 port	SCU-1800-REV-MU-16P

NOTE: Detailed specifications for IP Video, VoIP, TrueSpeed, Fiber, and WiFi options are available on the OneExpert CATV datasheet.


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