OneExpert Sweep

OneExpert CATV ONX-630/SCU-1800 Overview

November, 2016

DOCSIS 3.0/3.1 Portfolio for 1Gbit/s or greater Services

- Fulfillment & Service
- Headend / Hub / Plant Turn-up, Maintenance and Troubleshooting
- Proactive Network Maintenance
- Workflow & Asset Management

PathTrak and PNM

Return Path Monitoring Solution

VSE 1.8 GHz

Spectrum +MPEG + Noise troubleshooting platform

OneExpert CATV

D3.1 & Sweep field meter

StrataSync™ ENABLED

Field Operations Consistency & Visibility

WiFi Advisor

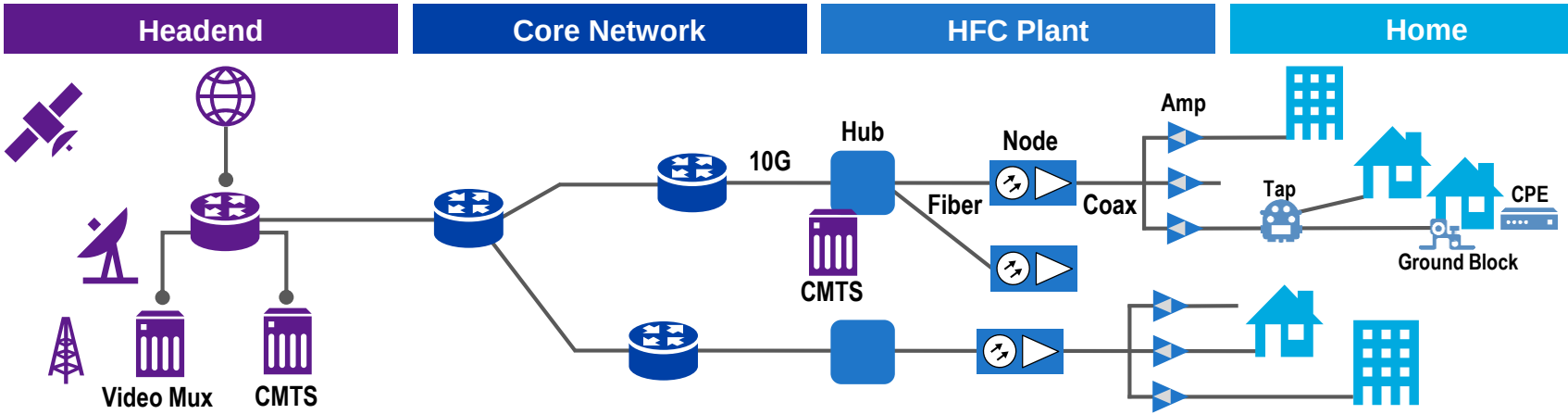
Powerful Wi-Fi testing solution

VSA Streaming / Monitoring

Continuous monitoring of live streaming content

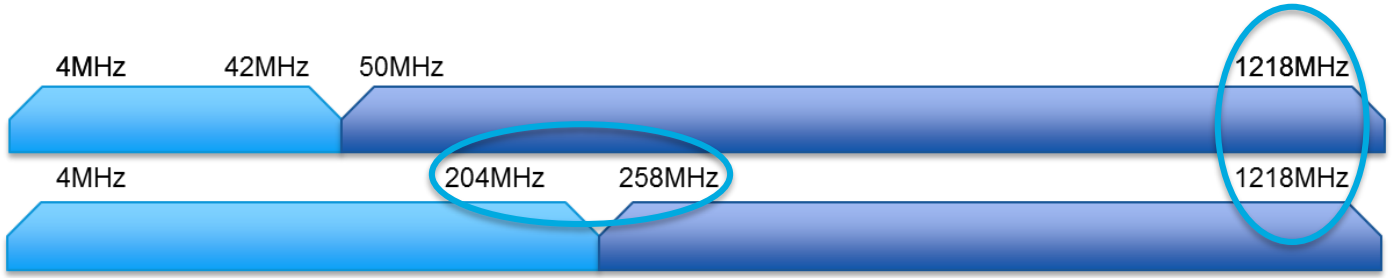
SCU-1800

D3.1 compatible Sweep Control Unit



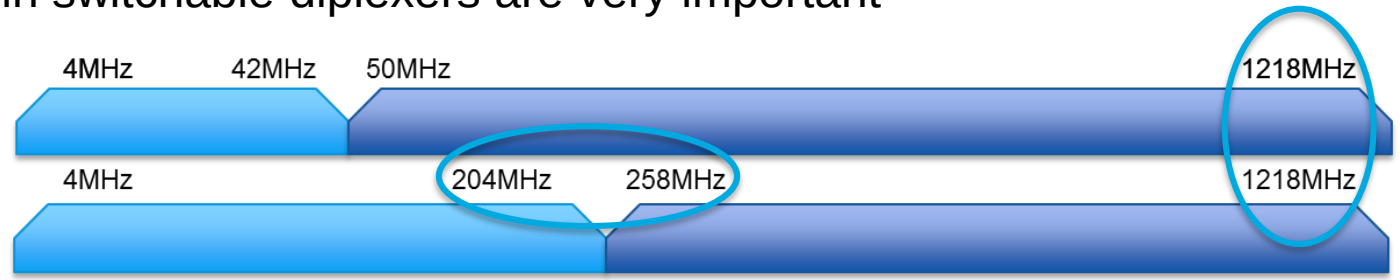
What's Driving Frequency Extensions?

- DOCSIS 3.1 offers >1Gbps speeds, enables spectrum usage to 200 MHz in return, and 1,200 MHz (1,800) in forward
- OFDM signal can be 192 MHz wide, and multiple signals
- Expanding return band to improve speeds can squeeze forward band if not expanded at the same time



Testing Plant frequency Extensions

- Need to verify amplitude vs frequency response of extended frequency range
- Inserting test signal is inadequate, as it only tests one frequency
  - Can’t assume other frequencies have same performance
  - Must have meter or analyzer that reads test frequency
- Contractor constructing the extension must certify performance
- Maintenance techs need up-to-date tools to maintain and troubleshoot upgraded plant issues
- Built-in switchable diplexers are very important



DOCSIS 3.1 – Sweeping for maximum benefit

- Test DOCSIS 3.1 signal physical performance and service (IP) quality
  - Measure OFDM signal level, MER, check ingress under carrier
  - Check for codeword errors, verify profiles lock and no uncorrectable codeword errors
- Verify network RF transmission performance by sweeping
  - Adding OFDM signals, typically at higher frequencies
  - Some extending frequency range of upstream and downstream
  - Need to optimize performance to obtain optimum efficiency
- RF Amplifiers still must operate within linear transfer range
  - Levels too low result in low MER, CN – unable to achieve higher order QAM
  - Levels too high result in intermodulation noise and distortion – again, unable to achieve higher order QAM

Introducing OneExpert CATV Sweep

- Maintenance technician focused OneExpert platform enables sweeping with simplified process, to speed testing and documentation
  - DOCSIS 3.1 physical and service test capability
  - Sweep transmission performance analysis
- Compatible with existing Viavi (formerly JDSU) sweep equipment (SDA-5500, DSAM) offering smooth, seamless integration and transition to next generation
- Meets needs of current and evolving networks, with sweep frequency range extended to 1,218 MHz forward, 204 MHz reverse
- Space conserving 1RU sweep control unit with 16 switchable return sweep ports
  - Less combining required
  - Improved noise performance
  - sweep receivers can be consolidated to conserve cost
- A pure, clean RF sweep signal with narrow pulses enables insertion between carriers.
- Documenting performance is simpler with StrataSync, making detailed sweep results easily accessible via browser

Next Generation Sweep Gear

OneExpert CATV

- Compatible with SDA-5500/5510
- Reverse Sweep capable to 204 MHz
- Extended Forward Sweep range to 1.218 GHz with new SCU (Sweep Control Unit)
- Software option for sweep
- Existing ONX models are field upgradable

New Units

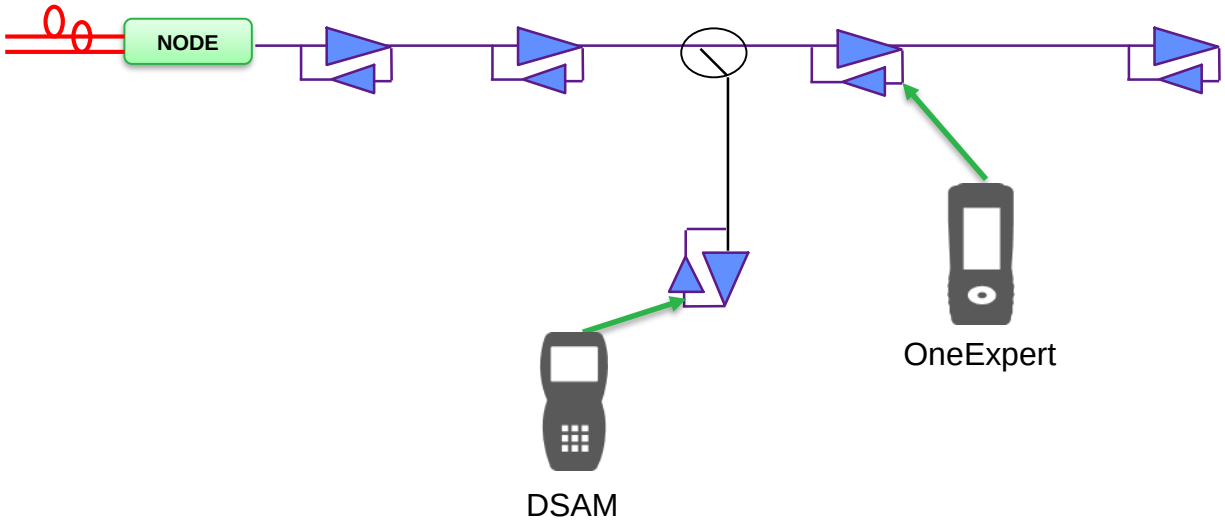
Existing Unit
Field Upgrades
Module & Software

Sweep Control Unit – SCU

- 1RU unit with Ethernet interface
- Sixteen switchable return sweep ports (software optionable)
- Forward TX to 1.218 GHz with ONX
  - Hardware capable up to 1.8GHz
  - 50dB Spurious Free Range
  - Narrow Sweep Pulses – fit between carriers
- Flexible operation
  - Forward + Single User Reverse (5500 replacement)
  - Multi-User Reverse (5510 replacement)

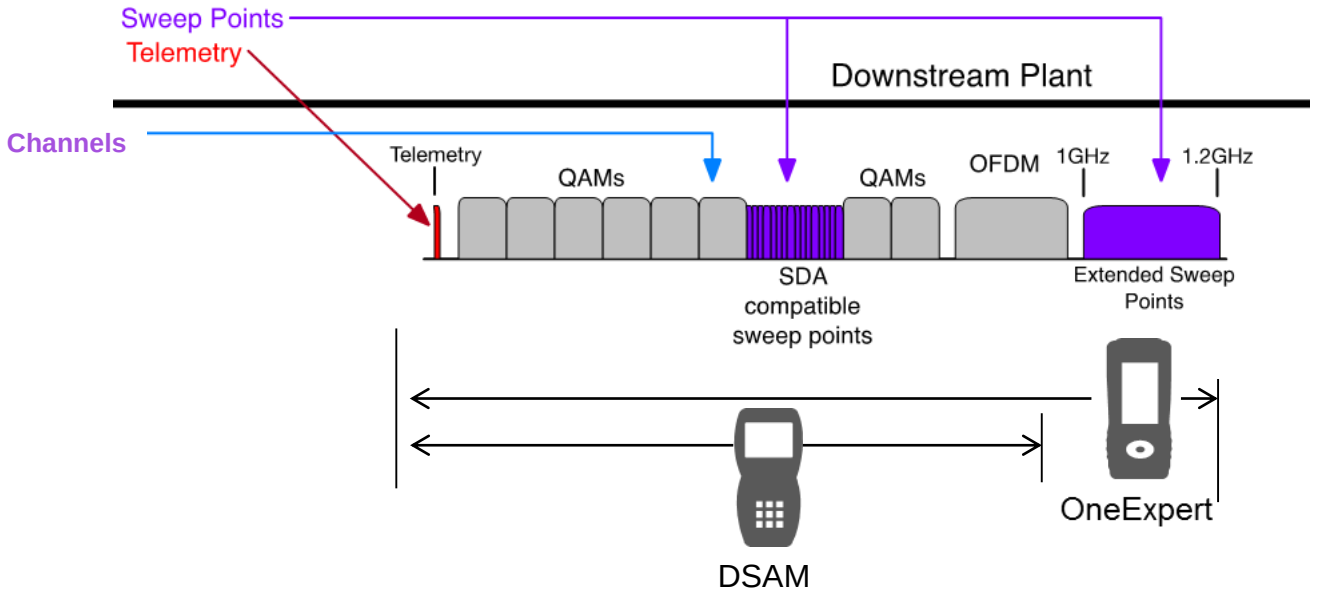
OneExpert Sweep
Compatible with DSAMs and SDA-55XX

- Easily migrate to OneExpert Sweep and DOCSIS 3.1
- Backward compatible with SDA-5500 & SDA-5510 sweep transmitters



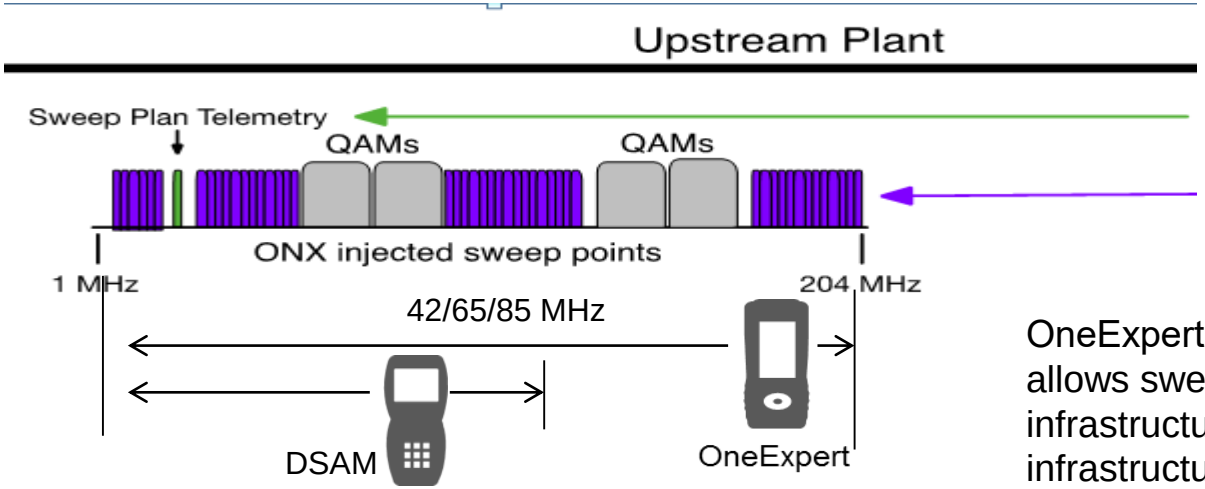
Sweep beyond 1GHz

SCU-1800

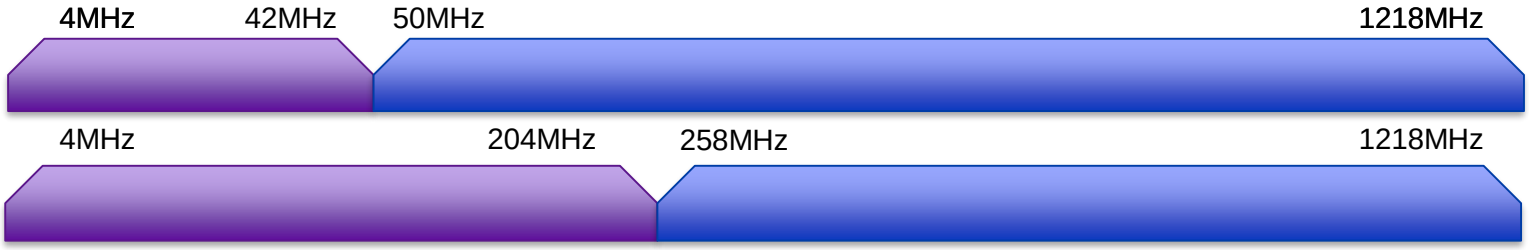


- ONX coupled with new Sweep Control unit can provide sweep to 1.2GHz and beyond
- DSAM units on same system are still compatible up to 1GHz.

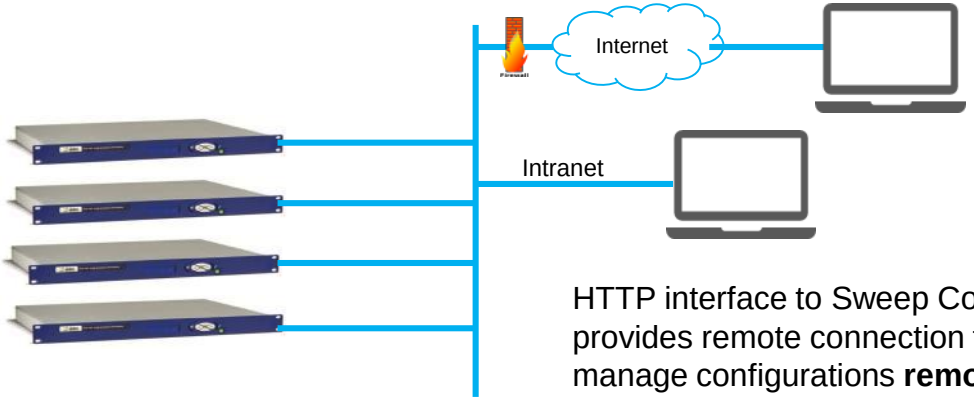
Reverse Sweep to 204 MHz



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



Configure Sweep Remotely

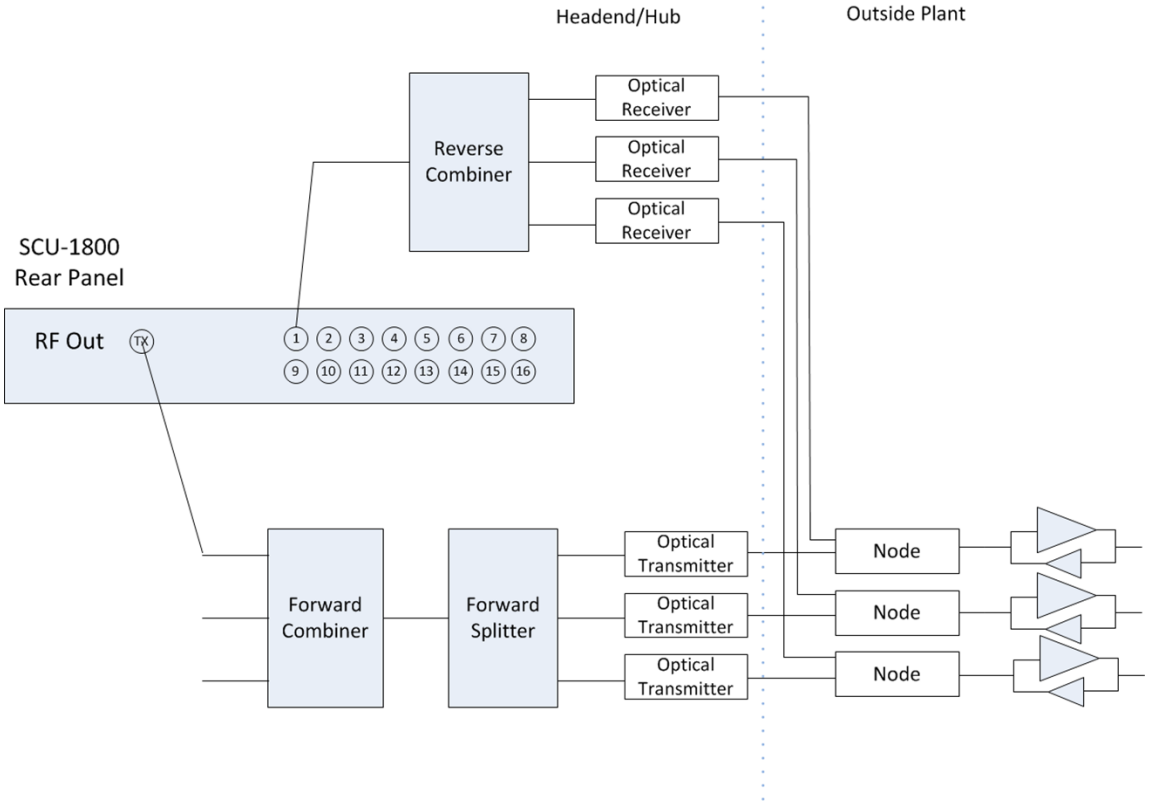


HTTP interface to Sweep Control Unit provides remote connection to easily manage configurations **remotely**

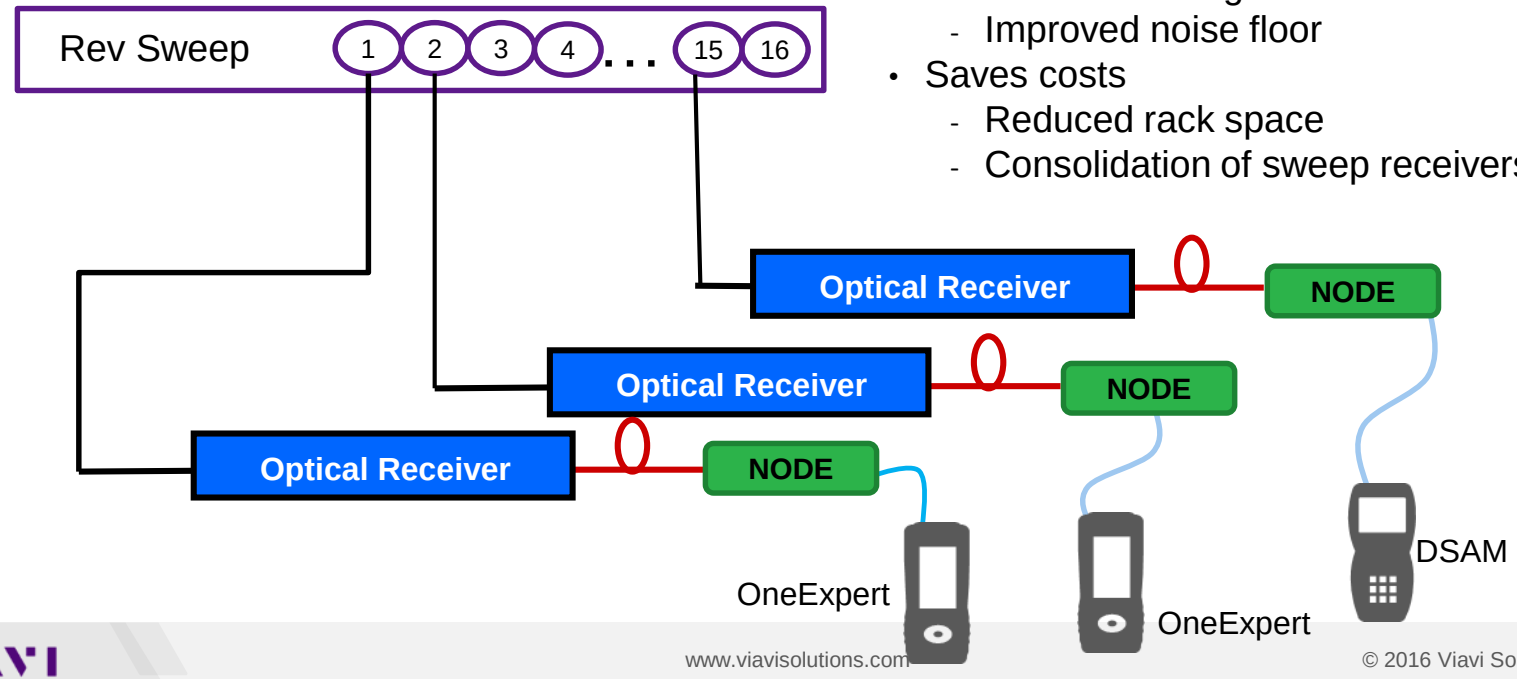
Configure Sweep Locally from a laptop

HTTP interface to Sweep Control Unit provides easy access to configurations **locally**

Sweep Configuration

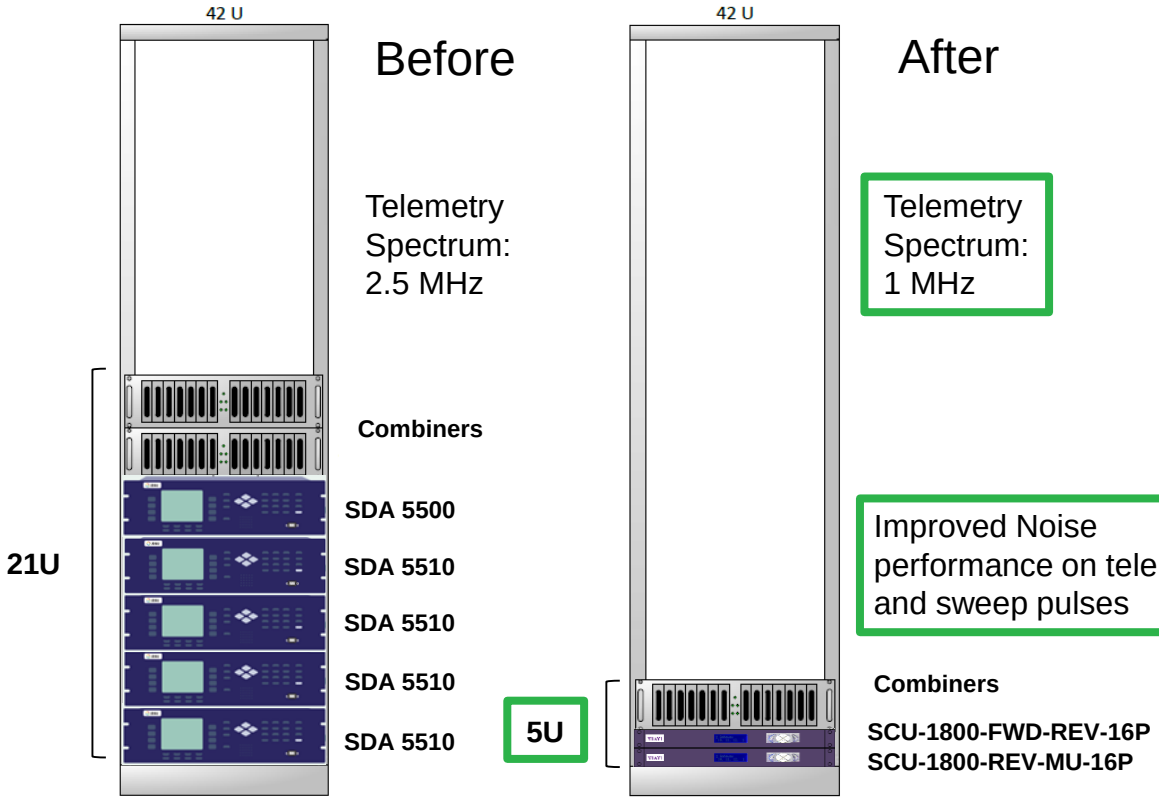


Multiple reverse sweep input ports
Reduces costs and improves performance



- Integrated 16 port capability (SW optional)
- Provides improved performance
  - Less combining
  - Improved noise floor
- Saves costs
  - Reduced rack space
  - Consolidation of sweep receivers

Conserving rack space, power consumption, and spectrum



Example:

- Typical hub with 256 nodes

Assumptions:

- Using 16 return sweep ports on FWD sweep transmitter
- Using 16 ports on MU REV sweep receiver
- Combining 8 nodes per SCU return input

Improved sweep flow

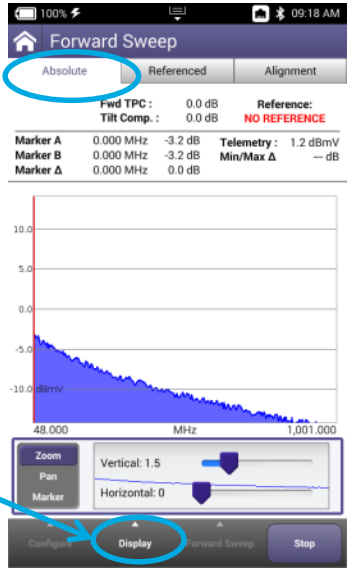
Consolidated sweep screens expedite the test process

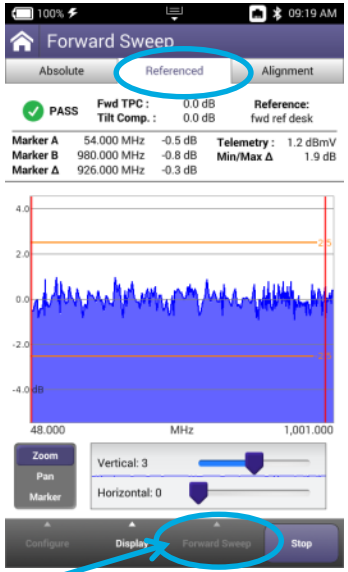
View the raw/absolute unreferenced sweep to save as a reference

View the normalized referenced sweep to identify issues

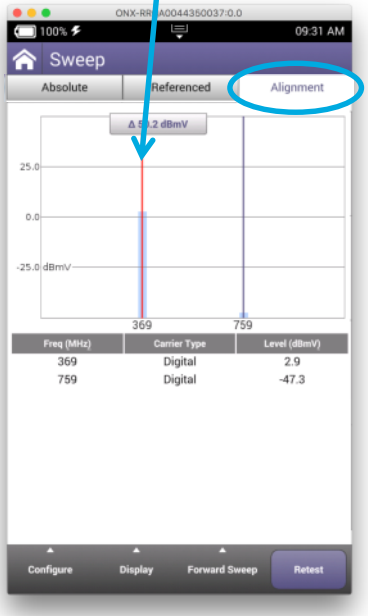
Pick tilt carriers for fast gain and alignment check. Sweep points or live carriers

Toggle between Portrait and Landscape mode



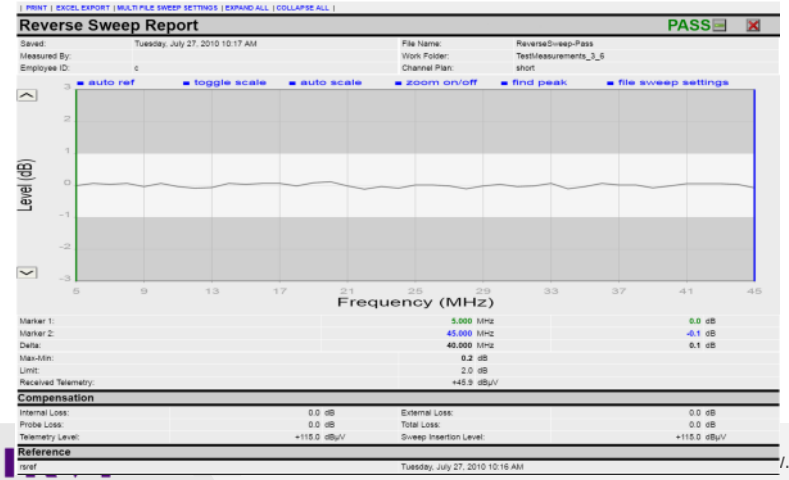


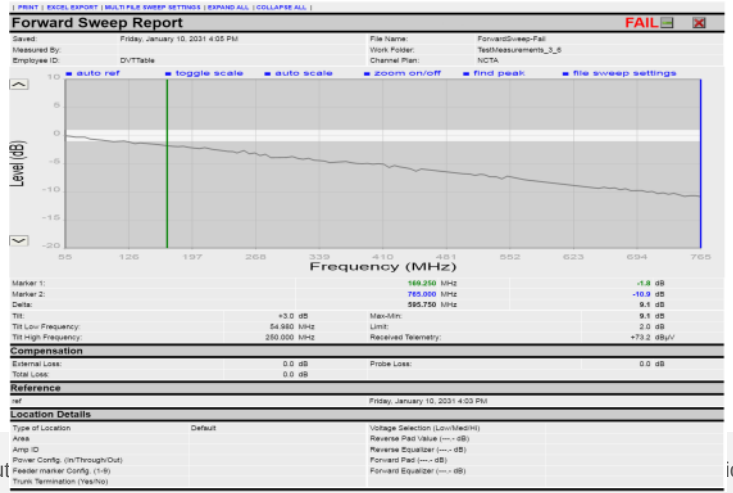
Easily change sweep modes Forward/Reverse



Sweep Reporting – Same reports for ONX and DSAM

- Utilize the same sweep reporting tool in StrataSync for DSAM and ONX
  - Same flexibility
  - Same capability
  - Same user interface
  - Mix and match reports done from DSAM and ONX for sweep reports
  - StrataSync cloud management simplifies usage



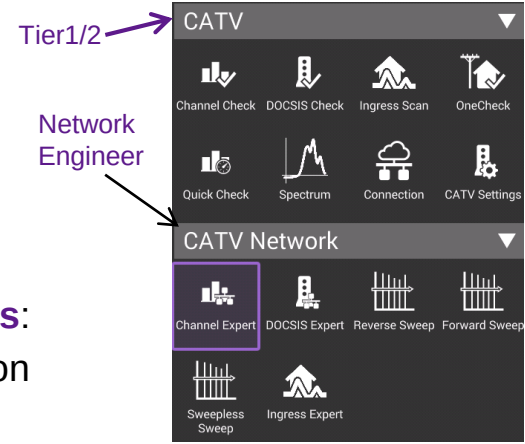


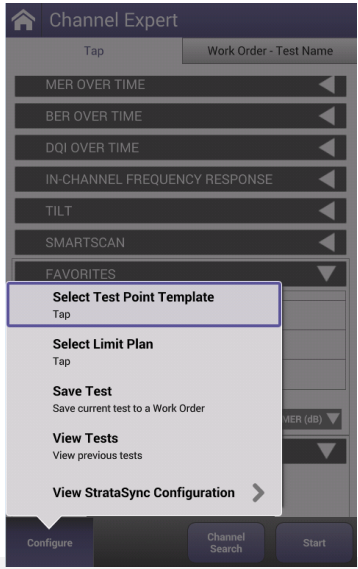
Documenting Sweep Test Data

- StrataSync simplifies
  - System is already in place – no need to purchase and configure server
  - No server hardware/software maintenance – centrally maintained by Viavi
- StrataSync Core functionality is included at no charge
  - data is stored for 30 days (plenty of time to export to Excel)
- StrataSync manages sweep instrument inventory
  - Know who has what when
  - Track calibration and firmware status
  - Manage firmware updates

Expert modes under “CATV Network” tab

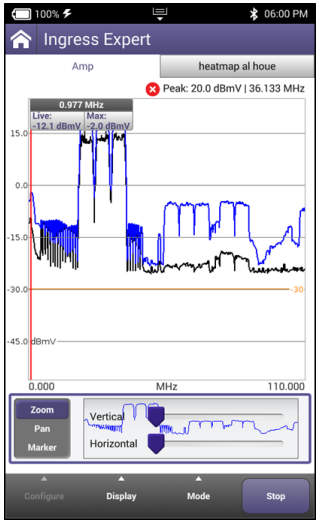
- Expert modes with advanced parallel processing find hidden problems and root causes
- Expert modes provide custom templates and plan linked with **network locations**:
  - **Test Point Template** including forward and reverse Test Point Compensation (TPC) that is applied to all CATV Network tests
  - **Limit Plan**
  - Capability to **compare live measurement** with **saved test**
- Expert Mode applications:
  - **Channel Expert → maintenance/network version of Channel Check**
  - **DOCSIS Expert → maintenance/network version of DOCSIS Check**
  - **Ingress Expert → Hyper Spectrum™ catches difficult return noise problems**
  - **Spectrum Expert**

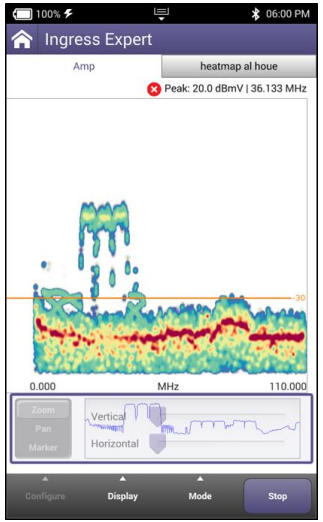




Return path alignment and troubleshooting

- Injected sweep plus ICFR from upstream DOCSIS carriers
- Hyper Spectrum
  - Overlapping FFT ensures display capture of impulse noise or fast transient interference
- Heat map
  - Entire D3.1 return band
  - Persistent/recurring interference can be detected in upstream signal bands





Three Different Mainframes available

ONX-610
Dedicated & Powerful
Fixed Diplexer, 48 W/Hr battery, No Module Support
16x4 DOCSIS Standard

ONX-620
Flexible, Expandable, & Powerful
Dual Diplexers, **96 W/Hr Battery**,
Add-On Module Capable, **32x8 DOCSIS** Std.

ONX-630
Fast, Powerful, & Flexible
Sweep Option, **Network Expert Modes**,
Add-On Module Capable, **DOCSIS 3.1** Std.

Model Comparison Table

Feature	ONX-610	ONX-620	ONX-630
48 W/Hr Battery (3-4 hrs)	✔	N/A	N/A
96 W/Hr Battery (6-8 hrs.)	Optional	✔	✔
Fixed Diplexer	42 or 65 MHz	N/A	N/A
Dual Diplexer	N/A	42/85 or 65/204	42/85 or 65/204
16x4 DOCSIS Channel Bonding	✔	✔	✔
32x8 DOCSIS Channel Bonding	Optional	✔	✔
DOCSIS 3.1 Physical & Service Testing	Optional	Optional	✔
Bluetooth & Mobile App	Optional	✔	✔
Add On Module capable	N/A	✔	✔
Field Exchangeable DOCSIS & RF section	✔	✔	✔
DQI Measurement	✔	✔	✔
Sweep Testing	N/A	N/A	Optional
3 Year Warranty	✔	✔	✔

Introducing OneExpert CATV Sweep

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
- Downstream scan *including* MER/BER in **about 60sec.**
- AutoChannel™ instantly identifies 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 finds hidden problems and root cause
- 40+ Years of trusted CATV testing knowledge integrated into one simple device

Flexible – Ready for your changing network needs

- *Dual Diplexer 42/85 or 65/204 with 1.2GHz support for next generation networks*
- Fiber Scope and Power Meter support for FTTx and fiber deep networks
- Gigabit Service testing over DOCSIS, Ethernet and WiFi
- Compatible with DSAM-6300 and SDA-55XX simplifies transition to new platform
- Common Sweep reporting for ONX-630 and DSAM ensuring consistency via StrataSync™

OneExpert CATV ONX 630 Benefits

- Optimizes plant performance, enabling higher spectral efficiency throughout the plant with DOCSIS 3.1
- Speeds troubleshooting as techs are able to quickly find and fix network issues
- Time-saving tests and simple documentation
- Long life – rugged, durable design for field use with long battery life
- Viavi is market leader in sweep, large installed base, with long history, trusted provider

DOCSIS 3.1 testing, but much more…

Consider the breadth of test capability offered in optional software and components:

Fiber optic power meter and fiber scope

USB optical power meter (OPM) to test fiber cable attenuation; optical fiber scope to test fiber connectors

WiFi Testing

BSSID, Spectral, and Channel View testing

SpeedCheck

Test both DOCSIS and Ethernet speeds to 1 Gbps with SpeedCheck

SIP VoIP

Quickly place VoIP calls and verify QoS via mean opinion score (MOS) values

IP Video

Test multiple standard and high-definition television streams regardless of compression format

StrataSync

Hosted solution manages assets, configurations, and test data

Resources

- OneExpert CATV Sweep Product Brief
- OneExpert CATV Product Page
- DOCSIS Program Page www.viavisolutions.com/docsis
- DOCSIS 3.1 Poster

www.viavisolutions.com