

# Compelling Advantages of Aurora's VHub™

For more information, please contact:



www.aurora.com  
2803 Mission College Blvd.  
Santa Clara, CA 95054  
Voice: 408.235.7000  
Fax: 408.845.9045

## Eliminate Hub Facility Expenses

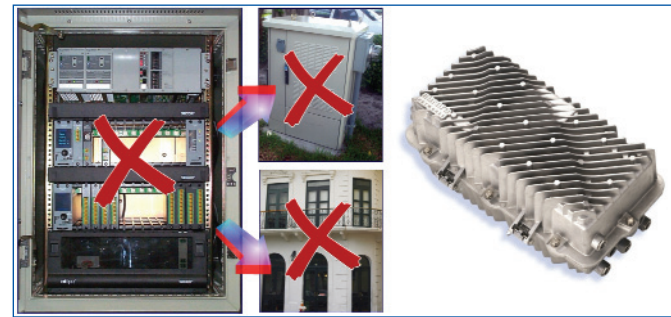
Aurora's Virtual Hub fundamentally changes the economics associated with offering and upgrading services to both metropolitan and small, isolated markets. You'll benefit from significant advantages when you eliminate the need to house your hub in a facility or cabinet.

### Lower deployment costs:

- Real estate
- Facility construction
- HVAC
- Back-up generators

### Eliminate the need to:

- Find and purchase real estate
- Acquire necessary permits
- Construct a facility



## Efficient, Effective, Flexible

### Business solutions

- Service 20,000 households from a single VHub
- Cost effectively serve multiple, small markets
- Deploy EDFAs without costly, environmentally controlled facilities or cabinets
- Easily drop in access service modules to generate additional revenue from existing plant

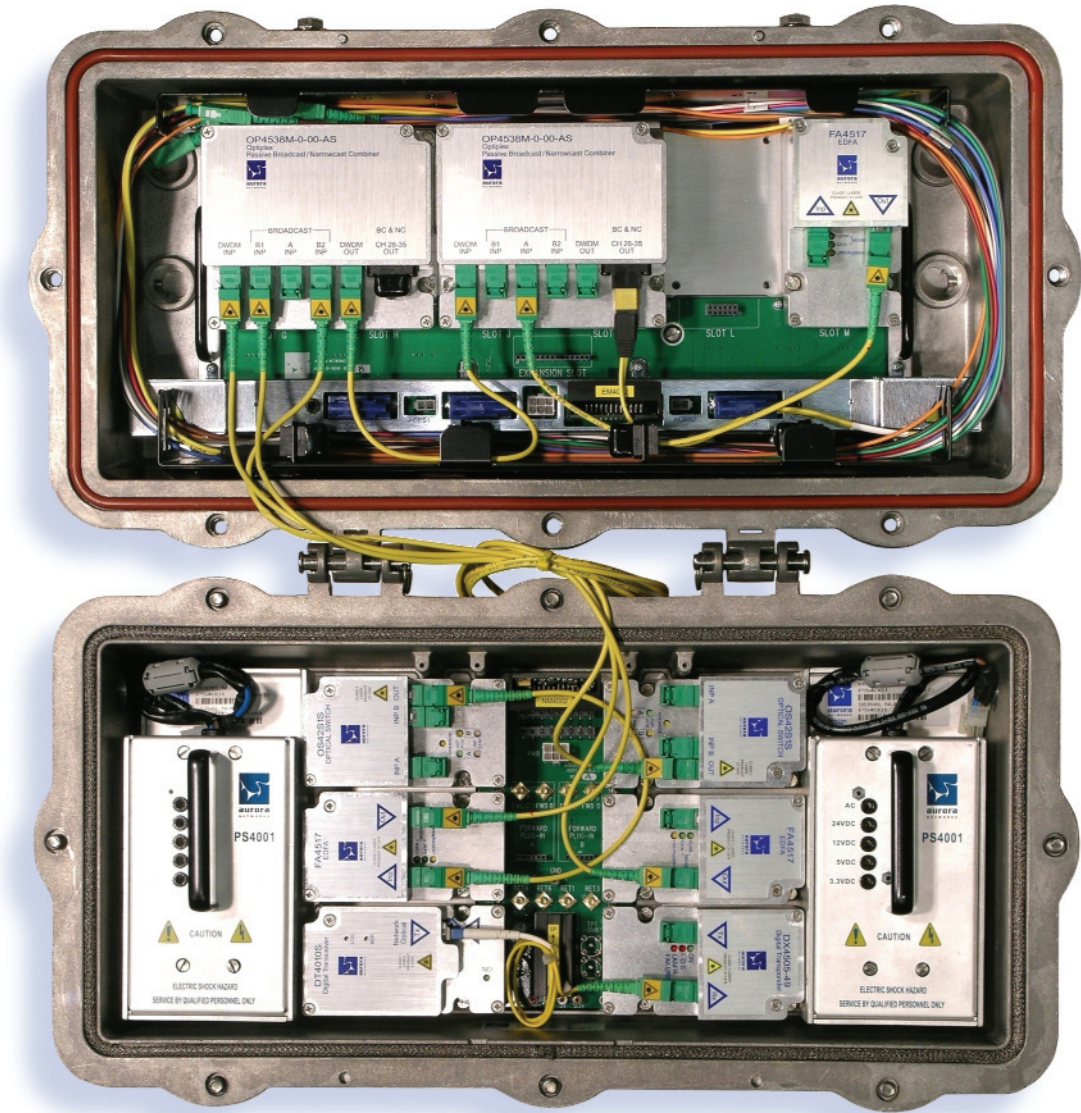
### Network infrastructure benefits

- Lower fiber consumption by using as few as three fibers to enable up to 24 nodes
- For fully redundant routes, service 24 nodes with only seven fibers
- Greatly reduce passive optical splitting and combining losses

### Technical advantages

- Populate the VHub with any combination of up to 12 modules
- Monitor and control VHub modules via Aurora's Opti-Trace™ EMS
- Reduce power consumption and other operating expenses

Aurora's VHub is also an ideal platform for FTTP solutions.



# Aurora's Virtual Hub

## Fully operational hub in a node housing



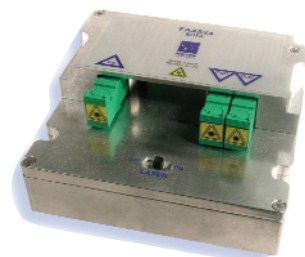
*A whole new light, growing brighter!*



Through innovative design and the application of advanced technologies, Aurora has created the functional equivalent of a typical 20,000-customer hub within a single node housing. With this virtual hub, cable operators can amplify, demux, combine, distribute, monitor, and control signals to support any of several architectures and wavelength schemas. Known for ruggedness and reliability, the same NH4000 enclosure used for Aurora's HFC and Fiber Deep node platforms is also used as the VHub enclosure. Cable operators can configure this environmentally secure chassis with a variety of internal modules — all capable of stable operation over a range of -40 to +85 degrees Celsius. All modules are monitored and, where applicable, can be controlled via Aurora's EMS or another SNMP-based management system.

### Light-Plex™ Modules

Aurora's Light-Plex modules integrate the functions of a DWDM narrowcast demultiplexer with a broadcast/narrowcast (BC/NC) combiner. The module has four optical inputs, one carrying the DWDM narrowcast services for up to 40 ITU-grid optical channels and the remaining three for either a single eight-way split or dual four-way splits of broadcast services. Of the nine outputs, eight provide the combined output of the split broadcast signal and one of the eight dropped narrowcast channels, and the remaining output provides a pass-through of non-dropped narrowcast channels. Up to three OP4538s can be installed in a single VHub to provide service to up to 20,000 homes. The OP4528 has the additional capability of managing the output power of each combined BC/NC output (by remotely adjusting each narrowcast wavelength's optical power level).



### EDFAs

FA4500 series node EDFAs are available as single-output 1550 nm optical amplifiers with 12, 14, 17 or 21 dBm optical output power, as dual-output amplifiers with 19 or 21 dBm per output, or as quad-output amplifiers with 21 dBm outputs.

### Optical Switches

The OS42S1S is a robust, non-latching 2x1 optical switch that allows rapid deployment of switching anywhere in the network without the expense of real estate or an OTN cabinet. These switches offer fast switching times with low insertion loss, can be monitored and remotely controlled, and provide route redundancy.

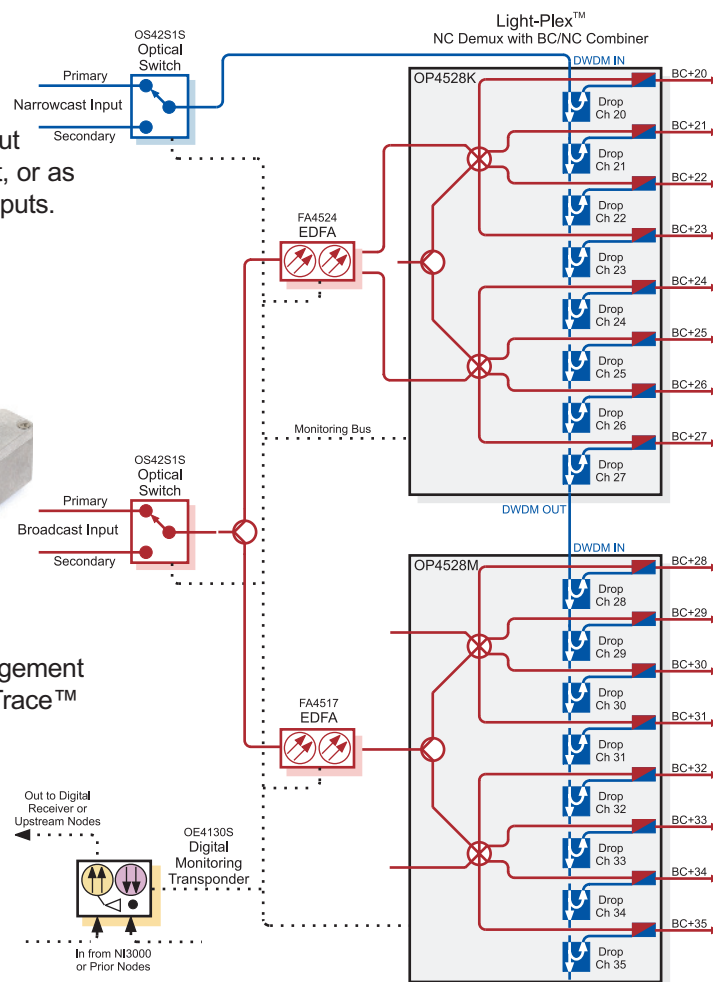


### Monitoring and Control Module

The OE4130S enables monitoring and management of modules in the VHub using Aurora's Opti-Trace™ EMS software.

### Digital Transponders

The DX4515 converts any input wavelength to an output on the DWDM ITU-grid and enables communication on fiber spans up to 200 km.



### Wide Selection of Access Service and Ancillary Modules

Aurora's Access Service modules enable delivery of Ethernet over fiber, interfacing with Aurora's SMART Media Converters™ and other off-the-shelf CPE devices. These modules are fully compatible with Aurora's high-speed digital transport system and DWDM optical transport technology. Cable operators can use them over dedicated fiber or over Aurora's digital return infrastructure to generate additional revenues from spare bandwidth in these systems.

### Optical Ethernet Multiplexer

The DS4004 features one high-speed (2.125 Gbps) network port and four Fast Ethernet local ports to enable Fiber on Demand™ services. Each local port supports a 100 Mbps full duplex wire-speed Ethernet link that is terminated at the customer premises. The DS4004 module includes a sophisticated add/drop multiplexing function to serve its 2.125 Gbps network port, supporting software-controlled add/drop of traffic at 100 Mbps granularity. This feature enables operators to add and drop only the amount of traffic required per site.



### Gigabit Ethernet OLT Module

Each GE4132M GbE Optical Line Termination module enables standards-based GEPON functionality for delivery of 1,000 Mbps Ethernet over fiber, interfacing with up to 32 standard GEPON Optical Network Units (ONUs) at customer premises. This node-based passive optical network (Node PON™) supports a point-to-multipoint fiber architecture with simple optical splitters. On the network side, the GE4132M is fully compatible with a standard GbE transport. A second SFP facility (Ethernet 2 port) is available to support daisy chaining of the Ethernet backhaul.

### Optical 1550 nm Broadcast Splitter with 1310/1550 Diplex Filters

In the OP4138 module, either a single 1550 nm broadcast input signal can be equally split eight ways, or each of two independent broadcast signals can be split four ways. The eight-way splitter (or dual four-way splitters) distributes the 1550 nm downstream signal to eight output fibers, while forward/return optical diplexers separate the eight downstream 1550 nm signals from eight upstream 1310 nm signals.



### Quad Analog Return Path Receivers

AR4041 receivers combine four separate RF signals (from optical inputs) into a single RF output. Prior to combining, gain control of the RF signal of each path can be independently adjusted. To exploit the benefits of digital return technology, separate high and low gain models are available, each optimized for different applications. The high gain models make them ideal for return paths in new FTTP architectures, where cascaded optical taps and NIUs are utilized. The low gain models, conversely, make them ideal for receiving analog returns from up to four nodes each, where conversion to digital return and retransmission is desired.

Every module that can be deployed in the VHub can also be deployed in an Aurora node, and all transmitters and receivers used in Aurora nodes will exhibit the same high standards of performance when used in the VHub. The optical transmit/receive ports of many modules are implemented with plug-in SFP transceivers for ultimate flexibility and affordability. Aurora also has the industry's widest range of optical field passives (couplers, splitters, filters, and multiplexers/demultiplexers).