VIRTUAL SEGMENTATION

Executive summary

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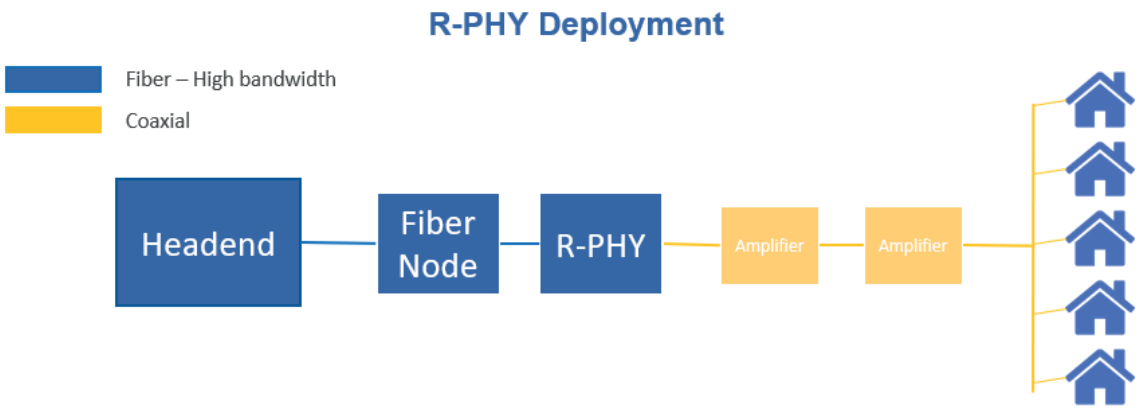
Introduction

The steady evolution of the DOCSIS system and Hybrid Fiber Coaxial (HFC) plants has enabled DOCSIS 3.1 delivered via Converged Cable Access Platform (CCAP). This evolution has provided an increase in density and scale, enabling operators to address the exponential year-on-year bandwidth increase demanded by customers.

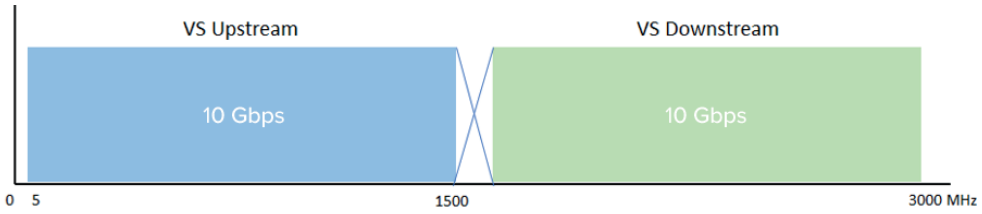
The next major evolution in the cable access network is a shift to a Distributed Access Architecture (DAA). DAA enables access hardware to be moved from the Headend to smaller hub sites or into the plants. This implementation is realized by separating the CCAP Core and PHY functionalities. The PHY is moved as close as possible to the subscribers while only the core functionalities remain in the Headend location. The R-PHY is connected to the core via a digital optical transmission link, which requires the operators to deploy fiber all the way down to each R-PHY location.



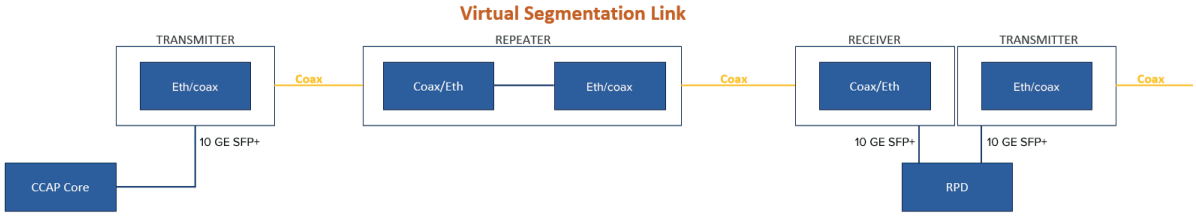
Deploying fiber deep underground puts pressure on operators in terms of CAPEX and time, particularly when the exponential bandwidth growth and the limited time available to deliver are taken into consideration. In addition to the monetary costs, underground fiber deployment takes time; particularly with regard to obtaining construction and local government permits. Even if overhead fiber is used in some scenarios, it may not be practicable for an operator to deploy fiber to a location with a limited number of subscribers.

Solution: Virtual Segmentation

Technetix' Virtual Segmentation (VS) solution allows operators to deploy PHY without the need for fiber deployment. VS is an innovative technology which enables 10 Gbps of symmetrical traffic to travel over a coaxial medium within the trunk lines. This is realized by utilizing the broad RF spectrum (5 MHz to 3 GHz) to overlay Ethernet traffic over coax.



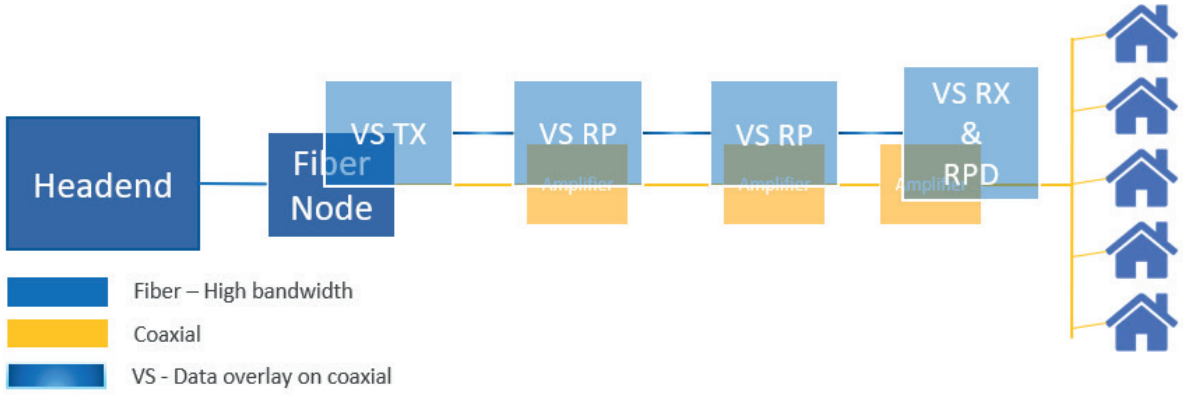
VS is a low-latency and low-power solution that provides the operator with an Ethernet pipe over coax. This starts and ends with an 10G SFP+ connection that can be used to link the core in the Headend and the PHY in the field. The high bandwidth(10 Gbps) and low latency (IEEE 1588v2) of VS ensures the smooth operation of the PHY.



VS enables operators to make great savings in CAPEX compared to deploying R-PHY via fiber. Operators can deploy R-PHY in little time at a very low cost, replacing existing amplifiers on the trunk line with low power-consuming VS nodes will also lead to a reduction in energy consumption.

A VS link is deployed between the core and the PHY, this consists of a Transmitter, Repeater(s) and a Receiver. The VS link also includes a control module which enables the operator to integrate the VS link into their own network monitoring systems.

Virtual Segmentation: Fiber level bandwidth over coax



The VS solution consists of 3 main components and a control module:

- **Transmitter:** is deployed on the fiber node and is connected to the core via a 10 G SFP+ connection. It receives Ethernet traffic from the core and converts it to RF which is then sent through the coax cable (or vice versa).
- **Repeater:** Repeater(s) are placed on the coax network at certain distances to compensate for the loss of data over the coax medium. A repeater receives the RF data degraded over the coax medium and converts it to Ethernet to regenerate the RF data. This means that in every repeater location the RF signal is regenerated from Ethernet data, eliminating any noise/interference that occurs on the signal due to the use of coax.
- **Receiver:** Receiver is deployed at the PHY location which provides a 10 G SFP+ connection to the PHY. It receives RF and converts it to Ethernet to feed the PHY (and vice versa).
- **Control Module:** Each VS Link is controlled/monitored with a single control module which can be deployed at the transmitter or receiver location. It enables the operators to remotely monitor and maintain (upgrade, configuration, etc) the VS link via SNMP and/or Web GUI.

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