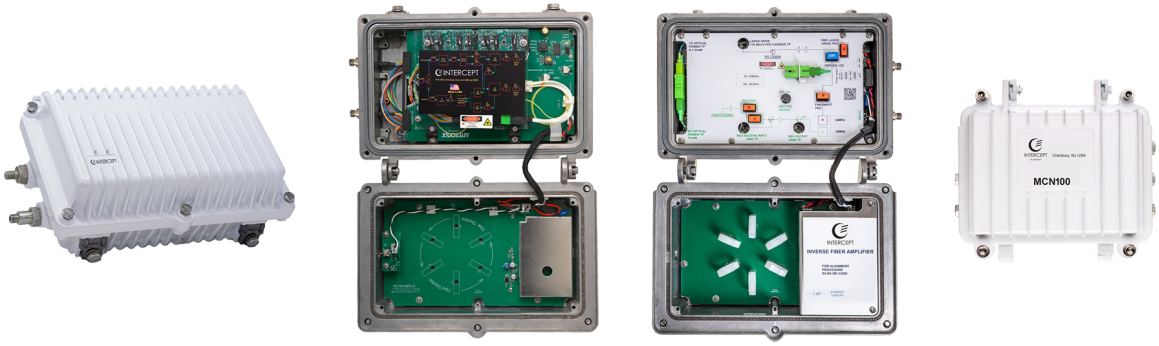
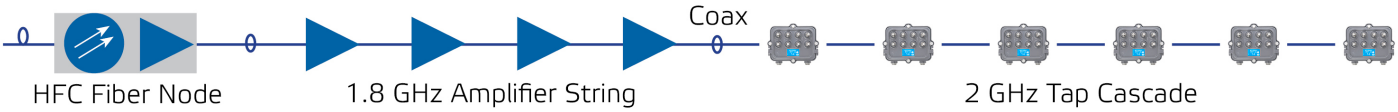
Intercept™ **FXP** Optical Express 1.8 GHz System



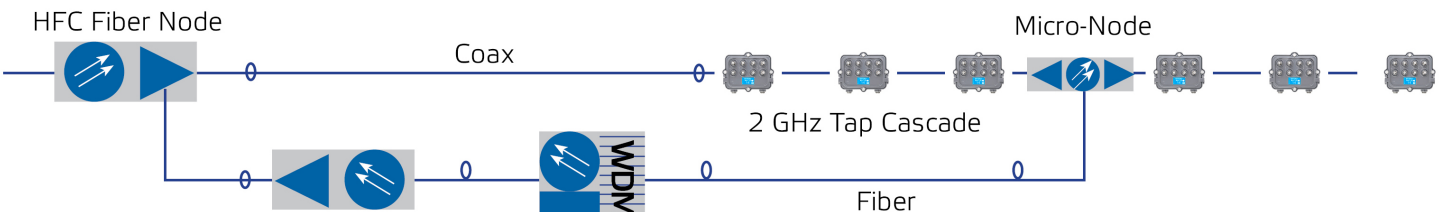
The Intercept™ **FXP** system is a targeted architectural solution for broadband cable networks designed for implementation of ESD (Extended Spectrum DOCSIS) up to 1794 MHz full band operation, as well as **FXP** (Full Duplex DOCSIS) networks operating up to 1218 MHz. The **FXP** system is designed for implementation as an upgrade in Brownfield scenarios where a conventional Node + N HFC component ecosystem utilizing DOCSIS 3.1 or earlier version is in place. More specifically, the **FXP** system is designed as an alternative brownfield implementation for DOCSIS 4.0 networks, capable of consistently delivering data throughput speeds of up to 10 Gbps in the downstream and Multigigabit speeds in the upstream data path.

Node + 4 HFC Conventional HFC Architecture



A transition to DOCSIS 4.0 operation represents an increase in frequency band of 47 % as compared with the 3.1 standard, and significantly higher attenuation loss in cable passive devices and RF components above 1 Ghz. Due to the extensive legacy infrastructure and central core technology which is vastly deployed throughout, of the DOCSIS 4.0 networks must be backwards compatible with legacy 1 GHz networks.

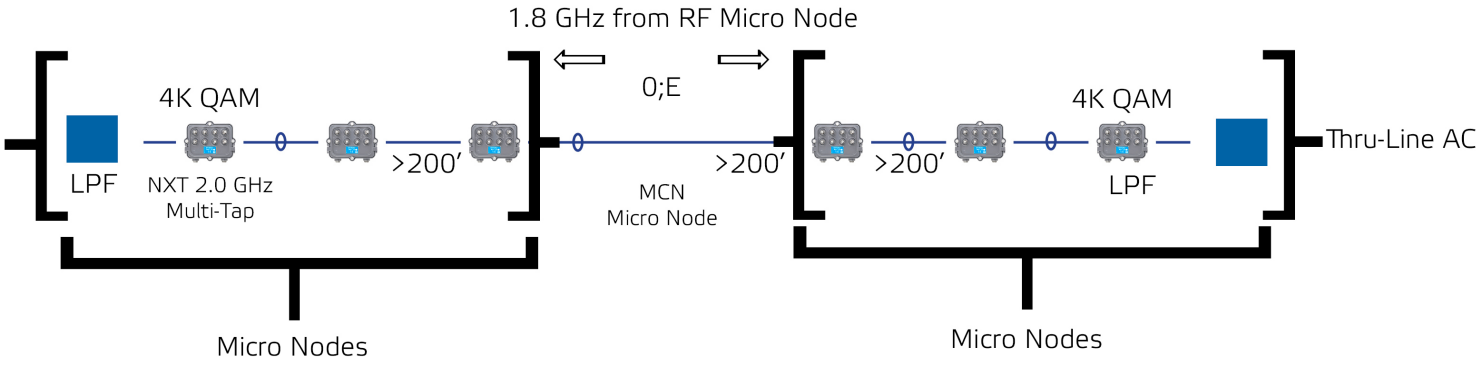
Intercept™ Micro-Node Architecture



Traditional HFC network architectures must be re-considered in order to meet these new demands of high frequency operation to 1794 MHz. In many cases where cable spans are stretched, current HFC architectures will not meet CPE input levels as designed, or required CNR and linearity for an economically and technically viable transition to full band 1794 MHz operation.

The Intercept™ **FXP** Architecture and system is designed to address these network design requirements. The **FXP** solution utilizes grey optics, or alternative optical wavelengths, DWDM technology and an optical overlay architectural approach to overcome excessive coax losses, resulting in optimal spectral density at end of line and maximum throughput and modulation schemes of 4096 QAM at the highest end of the frequency band, and resulting maximal data rates.

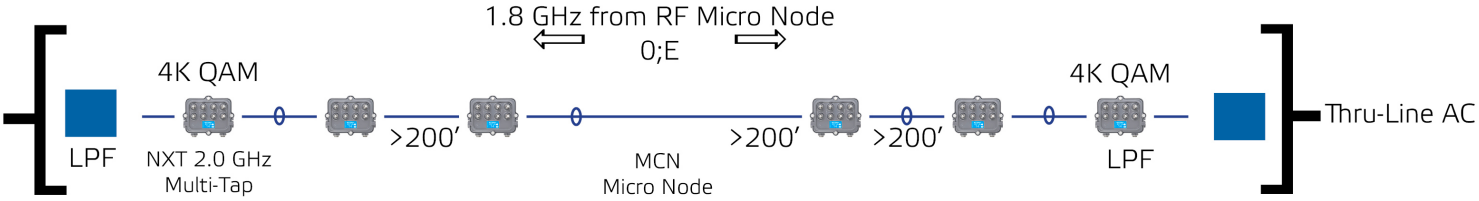
Conventional HFC Node + N architectures deliver signal optically to a primary fiber node or remote PHY device (RPD) which converts the optical signal to electrical for distribution to the last segment of the infrastructure. The conventional last mile active infrastructure for Node + N networks requires additional amplification to overcome signal level loss due to extensive coaxial cable runs and attendant cable loss. A conventional architecture's RF amplifier cascade is capable of restoring signal levels and power but also add significant power level requirements and noise to the signal delivery, compromising end of line CNR and MER and corresponding spectral density. Virtually all signal degradation occurs in the coaxial plan segment of he network.



Newly segmented Micro Node architecture of @ 3 Tap RF service groups significantly improves end of line performance throughout.

A Node + 0 architecture would solve some of these signal loss challenges but requires a complete redesign and reconstruction of the network segment, at significant or prohibitive cost A traditional HFC application to 1794 MHz would require additional calibration of the network components. 1.8 GHz RF amplifiers will require higher gain and higher input tilt and sensitivity, requiring more power. A conventional HFC architecture implementation therefore will likely be most suitable only for higher or medium density urban areas, and unsuitable for rural and semi rural network segments with longer cable spans between taps and lower subscriber density areas, where cable losses are more pronounced. In such scenarios, higher order modulation profiles are not achievable for consistent end of line coverage, resulting in sub optimal throughput relative to construction costs and investment.

A solution which can reduce tap span length without respacing of amplifiers or rearchitecting the segment would solve many of these implementation challenges of a migration to 1794 MHz full band operation.



Low pass filters installed at the extremes of the cascade isolate the RF service group while allowing AC to pass through to downstream devices.

The Intercept™ FXP system:

- Overcomes excessive coaxial cable losses in stretched or low density network areas
- Does not require respacing of RF amplifiers
- Eliminates all traditional RF amplifiers
- Does not require reconstruction or rearchitecting of legacy networks
- Delivers optimal end of line performance and MER
- Provides a fiber infrastructure which is consistent with an eventual migration to FTTH
- Can be launched selectively from any output leg of the HFC fiber node
- Provides an incremental upgrade path and investment curve which is far more economical than Node + 0 or FTTX
- Enables broadband operators to offer the most competitive billboard data rates as high as 10Gbps DS consistently and reliably, even in lower density network areas
- Provides a more economical alternative to Node + 0 approaches with superior ROI and accelerated time to market
- Can be widely operationalized using existing RF construction and technical labor skill sets
- Provides wide performance and operational margins, ensuring consistent results across a variety of use case, and improved repeatability of successful deployments