



**DragonWave**

# BUILDING **RELIABLE** NETWORKS





DragonWave

# BUILDING RELIABLE NETWORKS

As service providers and enterprises scale their wireless access networks to enable powerful new applications and services, many existing backhaul solutions are rapidly becoming a major bottleneck. DragonWave-X is building reliable backhaul networks everywhere with packet and hybrid microwave backhaul solutions that unleash the potential of true broadband mobility. Designed to meet the varied requirements of mobile networks, small cell deployments, public safety and other applications, our highly flexible backhaul solutions deliver unmatched capacity, reliability and cost efficiency, while supporting a smooth evolution to advanced packet networks.

# DRAGONWAVE-X SOLUTIONS



## ANY-G OPTIMIZED BACKHAUL

Engineered for the requirements of tomorrow's networks, DragonWave-X's solutions respond to the needs of LTE service providers, delivering native packet transport, synchronization, low latency, multi-Gigabit capacity and convergence of existing TDM traffic.



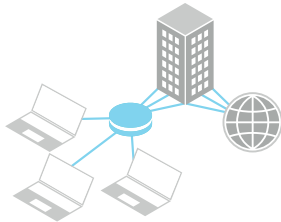
## LONG HAUL BACKBONE

With DragonWave-X's Harmony Trunk products, operators can build high capacity long haul network backbones.



## SMALL CELL NETWORKS

DragonWave-X's fully integrated, zoning-friendly small cell platform allows mobile operators to expand their mobile presence, improve coverage and increase network capacity in high user-density areas.



## LEASE LINE REPLACEMENT

Replace leased line services and eliminate expensive recurring telecom costs while improving capacity and availability with a packet microwave network.



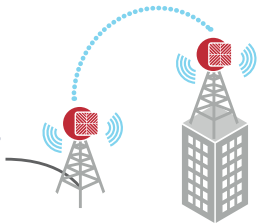
## PRIVATE & ENTERPRISE NETWORKS

Municipalities, healthcare facilities, financial institutions, schools, government institutions and other organizations can build carrier-grade private networks, achieving payback within the first year.



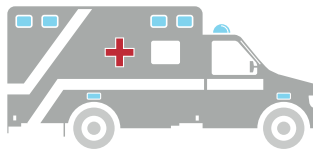
## SDN

DragonWave-X's Harmony Enhanced, Enhanced<sup>MC</sup> products are all software upgradeable to SDN, to enable future network intelligence.



## LAST MILE FIBER EXTENSION

Extend high-speed IP services beyond your existing network. DragonWave-X products are ideal for network hardening and disaster recovery, as well as for applications that require both legacy TDM services and carrier-grade, high-capacity native Ethernet.



## PUBLIC SAFETY

DragonWave-X provides essential inter-site connectivity and backhaul solutions for first responders, city facilities, wireless mesh networks, surveillance systems, city fleets and sensor networks.

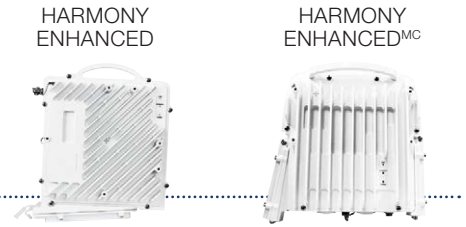


## MULTI-GENERATION MOBILE BACKHAUL

DragonWave-X offers the industry's only software-configurable microwave solution that can easily switch from hybrid to full-packet transmission, offering a smooth transition from 2G/3G to next generation 4G / 5G networks. Providing TDM and packet interfaces with a single end-to-end management framework.

# PACKET RADIOS

CAPACITY, SPECTRAL EFFICIENCY, RELIABILITY



DragonWave-X packet microwave solutions deliver new levels of capacity, spectral efficiency and reliability—all at the lowest total cost of ownership. To provide maximum flexibility, the products cover licensed and unlicensed frequencies from 6 GHz to 42 GHz.

The Harmony product family delivers unmatched all-outdoor performance for a wide range of point-to-point wireless applications. The Harmony Enhanced and Harmony Enhanced<sup>MC</sup> product lines deliver the industry's highest system gain supporting transmit powers of up to 34dBm in an all outdoor radio. Lastly, the Harmony Enhanced<sup>MC</sup> takes licensed microwave capacity to a higher level with multi-channel capability in an install-friendly form-factor

With unmatched radio performance, simple installation and operation, as well as sophisticated remote management capability, DragonWave-X's packet solutions deliver significant life-cycle cost savings for service providers, enterprises and government organizations

- Licensed point-to-point wireless from 6 GHz to 42 GHz
- High spectral efficiency using a combination of Bandwidth Accelerator and 4096QAM
- Highest capacity support with dual channel capabilities delivering up to 4 Gbps per radio using 112MHz channels
- Packet based network synchronization with Synchronous Ethernet (SyncE) and IEEE 1588v2 TC/BC
- TDM/Ethernet interfaces with optional indoor units for network evolution
- Service-aware radio to support differentiated QoS with up to 8 hardware queues
- 30% reach improvement with industry leading system gain
- Service aware Adaptive Code and Modulation (ACM)
- Comprehensive Ethernet OAM support (per IEEE 802.3ah, IEEE 802.1ag and ITU Y.1731)
- Carrier Ethernet 2.0 and SDN ready

# HYBRID / SWITCH

PURE PACKET SUPPORT, SCALABLE, UPGRADEABLE



The Harmony Hub 800 is an access and nodal switch providing pure packet support with ethernet and pseudowire capabilities, as well as hybrid modes with native TDM support. The Harmony switch is highly scalable and upgradeable, allowing a seamless transition from hybrid to packet networks. The Harmony Switch is a compact indoor unit which provide maximum flexibility for 2G, 3G,LTE, and next-generation traffic aggregation.

The Harmony Hub 800 is the perfect backhaul node for Harmony radio systems, with 16 Gbps switching capacity, and support for up to 12 radio directions in a single unit. In addition to supporting advanced Ethernet processing features, the Harmony Hub 800 can carry TDM traffic natively or via circuit emulation – a simple and cost-effective solution for operators moving to converged packet networks.

- Powerful IDU option for Carrier Ethernet transport and network evolution
- Pair with any DragonWave-X radio
- Up to 12 directions and 20Gb/s switching throughput
- Up to 48 x E1/T1 and 2 x STM-1 TDM ports
- 12 x 100/1000BaseT and 2xSFP Ethernet Interfaces
- Full suite of clock synchronization and recovery mechanisms
- E-LINE and E-LAN Carrier Ethernet services
- Advanced QoS mechanisms, performance monitoring and fault detection



# SMALL CELLS

URBAN-OPTIMIZED, ZONING-FRIENDLY, UNPARALLELED PERFORMANCE

AVENUE  
LINK



DragonWave-X's Small Cell portfolio provides backhaul solutions that are urban-optimized to comply with strict city zoning regulations and designed to blend perfectly into the urban landscape.

Avenue Link delivers unparalleled backhaul performance and flexibility in the 24-60 GHz bands, with 500 Mbps capacity per hop and up to 1 Gbps with the DragonWave-X Bandwidth Accelerator for high capacity, low latency and availability.

The Avenue product is designed to meet the size, weight and aesthetic requirements set by city zoning officials and can be deployed on various structures, including street lamps, traffic light poles and the sides of buildings.

DragonWave-X's Small Cell solution is fully integrated in Netviewer and interoperable with the complete DragonWave-X solution.

- Licensed unlicensed point-to-point wireless from 24 GHz to 60 GHz
- Integrated backhaul radios and antennas
- Zoning-friendly, environmentally hardened enclosures
- Backhaul powered by Horizon for unparalleled packet microwave performance
- SynchE support
- Low delay backhaul

# LONG HAUL

COST-OPTIMIZED, LONG DISTANCE / REMOTE CONNECTIVITY

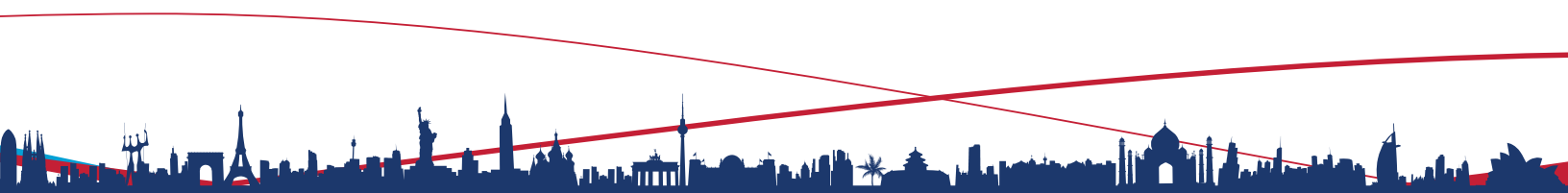
HARMONY  
TRUNK



The Harmony Trunk long haul trunk microwave solutions offer a simple migration plan when requiring support of legacy TDM to Native Hybrid (TDM & IP) to Full IP data communications within your network.

With all-indoor and all-outdoor deployment options, our long haul trunk microwave system provide a cost-optimized solution for long distance backbone or remote site connectivity. The platform supports an innovative dual terminal design greatly reducing space and power requirements.

- Trunking radios for long-haul, high-capacity transport
- Best in class density with up to 16 RF channels per rack
- +35dBm transmit power
- Native TDM and native IP transmission, providing multiple software-selectable hybrid modes within a single platform
- Flexible modulation from 4QAM to 512QAM with Hitless Adaptive Modulation
- XPIC, space and frequency diversity support



# SIMPLE MANAGEMENT

## NETVIEWER

### NETWORK AND ELEMENT MANAGEMENT SYSTEM

NetViewer is a comprehensive, carrier-class management solution for Service, Network and Element layers (NMS/EMS). NetViewer offers network operators a broad set of tools that simplify the operation, administration, maintenance and provisioning (OAM&P) of DragonWave-X's end-to-end portfolio of products. This solution also provides extensive fault management, performance monitoring, and security management capabilities.

This standards-based solution uses a highly scalable application server and delivers a real-time representation of network topology, connectivity and operational status. NetViewer enables operators to respond quickly to changing requirements, thereby reducing time to-service and delivering significant operational cost savings.

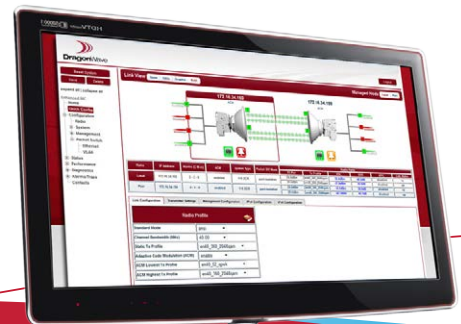
- Simple and intuitive point-and-click Graphical User Interface (GUI)
- End-to-end service provisioning
- Network-wide device discovery
- Real-time dashboard with performance monitoring, statistics and charting
- Bandwidth utilization indicators
- Advanced fault isolation and management
- Real-time configuration and security management
- Simple integration with external operations support system (OSS)
- Innovative and scalable application server architecture
- Covers complete DragonWave-X portfolio

## LINKVIEW

### WEB-BASED LINK MANAGEMENT

LinkView is DragonWave-X's intuitive Element Graphical User Interface (GUI) available across the full product portfolio and easily accessible as a web-based application. LinkView provides the user with an easy to use web interface to monitor and configure the full radio link. The visual representation of the full link (includes HSB and XPIC) delivers a quick view of the link status to help operators troubleshoot their radio or link issues. The local and remote end of the link can be managed through the same window greatly simplifying the troubleshooting process. LinkView comes standard on all DragonWave-X radio platforms, no separate application install is required.

- Simple and intuitive point-and-click (GUI)
- Ethernet, Radio, and Link Based Stats
- Flexible presentation of statistics
- View and control of both local and peerradio link ends
- Real-time dashboard with performance monitoring, statistics and charting
- Bandwidth utilization indicators
- Real-time configuration and security management
- Covers complete DragonWave-X portfolio



# DRAGONWAVE-X

## FEATURES AND BENEFITS



Best in class spectral efficiency with  
4096QAM and DragonWave-X's proprietary  
Bandwidth Accelerator+ technology



30% Reach improvement with industry  
leading system gain



Complete product portfolio covering 6 GHz up to 60 GHz  
with Carrier class Ethernet switching



End to end network management including service  
provisioning FCAPS capability



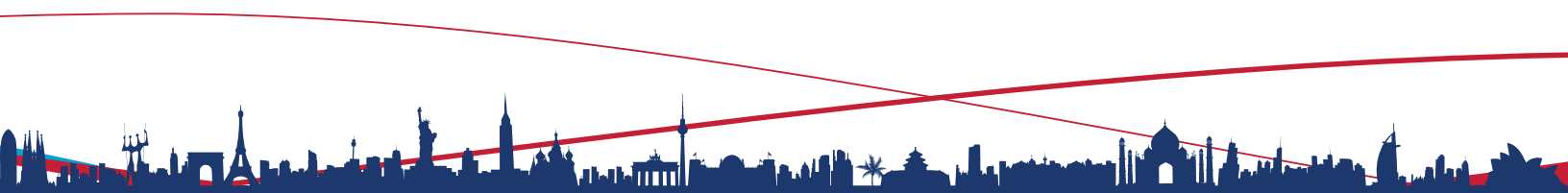
Packet synchronization solutions for next generation  
mobile networks



Urban-optimized Solutions tailored  
for Small Cell backhaul



Highest capacity wireless solutions  
delivering up to 8 Gbps per link





[www.dragonwavex.com](http://www.dragonwavex.com)

600-411 LEGGET DRIVE  
OTTAWA, ONTARIO  
CANADA, K2K 3C9

Information subject to change without notice. DragonWave®, Horizon® and Avenue® are registered trademarks of DragonWave-X. ©2018 DragonWave-X. All rights reserved.