# Tsunami® Backhaul Made for Carriers and Mobile Network Operators

## Overview

With the growing smart phone penetration, broadband proliferation and soaring customer churn rates, today's network operators live by the adage – perform or perish. MNOs (Mobile Network Operators) are constantly compelled to upgrade their network including edge, backhaul and core networks to support the unprecedented demand for high capacity and high QoS communication service.

This application overview examines the backhaul aspect of a network – the impact of today's bandwidth demands, existing challenges & solutions and how the Tsunami® family of wireless backhaul products  can tackle the looming backhaul challenge in the light of the 4G LTE technology.

## The 4G LTE Tidal Wave

As per Cisco Visual Network Index, the Global mobile data traffic is forecasted to increase nearly tenfold between 2014 and 2019. It will grow from 2.5 Exabytes to 24.3 Exabytes at a (CAGR) rate of 57%, of which 4G is predicted to represent more than two-thirds of all mobile data traffic by 2019.
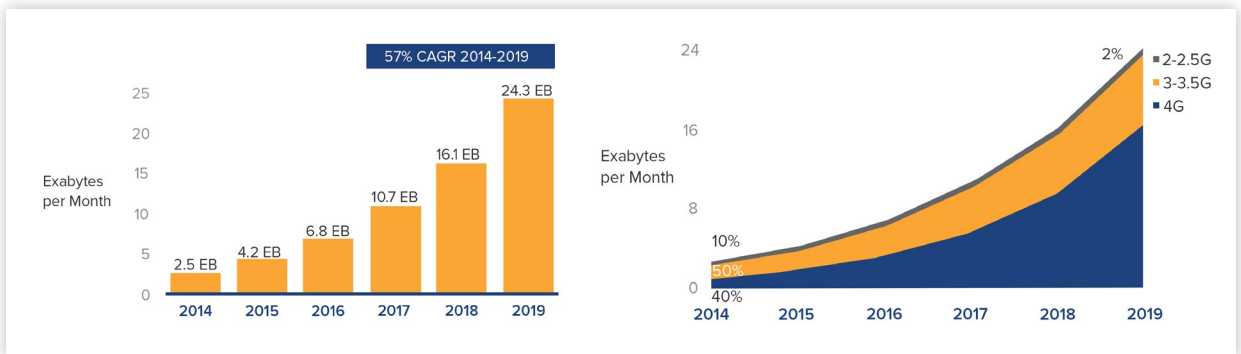


To make matters more challenging, new strategies such as small cell and Wi-Fi offload though designed to relieve networks and alleviate congestion, conversely stimulate higher usages. This in turn drives a requirement for faster network speeds and easier access, leading to further congestion in the backhaul networks, driving the immediate need for scalable backhaul solutions to support the 4G LTE tidal wave.

## The State and Limitations of Popular Backhaul Solutions

Predominantly there exist two types of solutions that govern the backhaul networking space today:

1. Wire-line solutions such as copper and fiber.
2. Microwave wireless solutions

Fiber Solutions: Preferred for their ultrafast speeds and rock solid reliability, fiber solutions are rapidly replacing copper solutions. However the biggest drawback of fiber based solutions is the heavy price tag associated with them. Installation of fiber solution can typically range from $200K to $650K per mile, constituting of labor intensive tasks such as cabling, digging, trenching and not to mention the 'right of way' permits that cause time delays as well, making fiber solutions quite unfavorable to address the looming backhaul challenge.

Licensed Microwave based solutions: The primary advantage microwave solutions deliver is the easier installation and the cost advantage when compared to fiber. On the flip side, inherent to its high frequency and highly directional beam width, microwave suffer from reliability issues such as rain-fade, nLoS (near and non line of sight) operation etc. Additionally, microwave solutions operate in licensed channel bands and must contend with spectrum availability challenges.

To summarize what we've seen so far, mobile operators, across the world, experience two big challenges:

1. Exponential demand for higher capacity
2. Spiraling Network Costs i.e. increasing Cost/bit

## Backhaul that's Reliable, Cost-effective and Simpler to Deploy

Proxim Wireless the leader in advanced broadband systems, keenly understands these limitations and addresses them with its high capacity, Tsunami QuickBridge® point-to-point (PtP) license exempt sub 6 GHz wireless solutions. Taking advantage of Proxim's ClearConnect® technology and advanced embedded features and the wide experience in breakthrough hardware design, Tsunami® solutions are purpose built to provide high availability system performances even in the most hostile RF conditions. Below are some of the many reasons why Tsunami® is the ideal solution for LTE mobile operators and service providers needing rapid and reliable backhaul solutions.

## Overcoming Backhaul Challenges with the Tsunami®

### High Capacity and Superior System Performance

The Tsunami® 10100 operating in the 5 GHz band achieves real world throughputs of 600 Mbps or greater and deliver consistent triple play services to meet stringent Evolved Node B LTE base station requirements. With Proxim ClearConnect® all Tsunami® solutions provide robust and reliable operation ion the most hostile of RF environments.
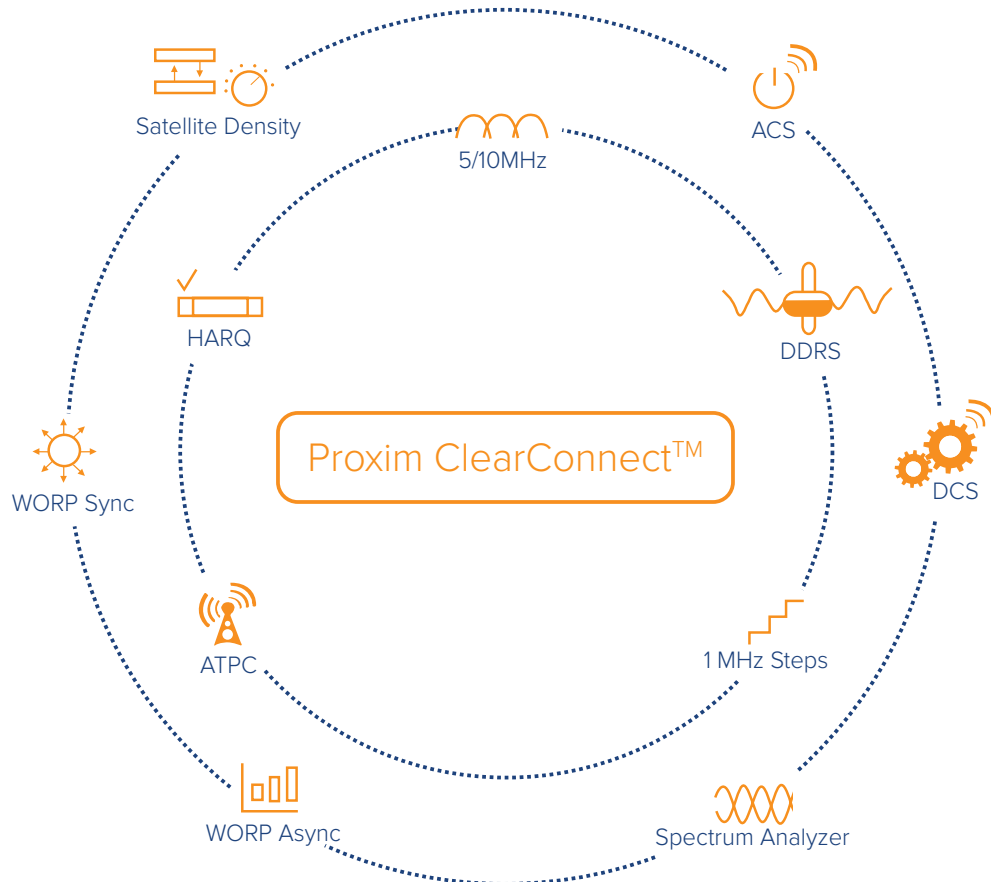


Proxim Wireless' advanced suite of dynamic and adaptive Radio Frequency technologies ensures high spectrum efficiency with minimal error rates in high density environments and under challenging interference conditions. The ClearConnect Technology consist a comprehensive set of Physical and Multilayer Features. For More Information, please visit the page: www.proxim.com/technology/proxim-clearconnect.

## Easy, Hassle Free and Quick Deployments

With easy to install radios and advanced deployment tools, Proxim's solutions dramatically reduce guesswork associated with initial deployments and allow quick installations with minimal effort (as shown in graphic below). Tsunami® radios are based on a combination of MIMO and OFDM technologies for NLOS operations and hosts a bouquet of antenna alignment tools like Beam X – auto alignment tool, Audible Antenna Alignment  and other Link Test Tools.

## Reliable

1. >350,000 hours MTBF: The Tsunami® 10100 is engineered with the highest grade components, resulting in a MTBF of almost 40 years.

2. IP67 Grade Enclosure: The IP-67 rated metal enclosure QB-10100 radios provides better ingress protection from extreme outdoor weather conditions compared to the regular plastic based IP-65 rated enclosure. The enclosures are tested under water at 1 meter depth for 30 minutes.

3. Surge Protected Connectors: Surge protected connectors limit the voltage spike to the radio by either blocking or by shorting to ground any unwanted voltages.

4. Wide Operating Temperature and Humidity Tolerance: The 10100 is designed to work in extreme cold and hot climatic conditions from -40 °C to 60 °C and Max 100% relative humidity (non-condensing).

## Control and Manage Effortlessly

Proxim's Advanced Cloud Based Carrier Management System, ProximVision® Advanced takes the next step in network management and control providing seamless command over very large Heterogeneous Network (Het Net) deployments. This ground breaking solution provides detailed fault reporting, configuration, administration, and provisioning support for all Proxim radio products including Wi-Fi access points, backhaul links, and point to multipoint solutions. Comprised of a wide variety of powerful tools, PV Advanced unifies management of the entire Proxim infrastructure, within a few clicks. From monitoring network performance to remote device configuration and management PV Advanced provides total control. For More Information:
Please visit: http://www.proxim.com/products/network-controller
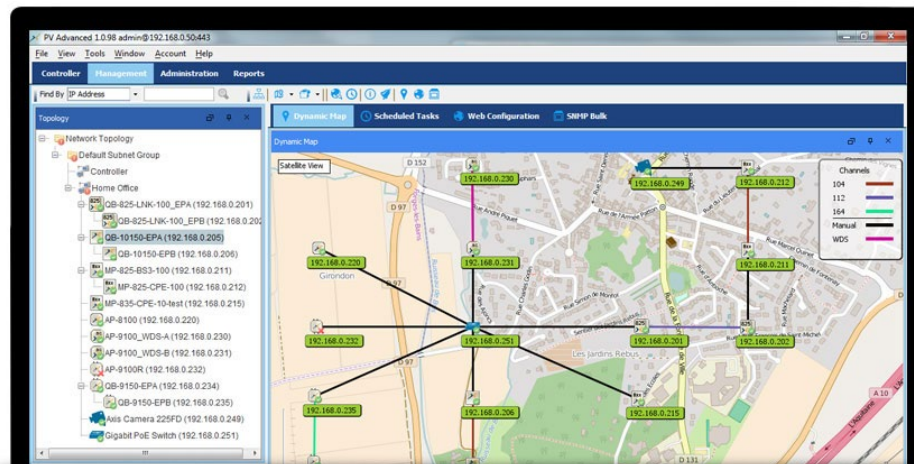
## Other in built Features for MNOs

1. ### Jumbo Frames

   Tsunami® 10100 ethernet port supports frame up to 9 216 bytes allowing it to fully blend into an operator network using large packet protocol such as MPLS. On the radio side, Tsunami® 10100 is using 11 000 bytes super frame with aggregation capability in order to gain over the air efficiency by reducing protocol overhead.

2. ### sFlow®

   sFlow® is an industry standard relying on traffic sampling to analyze network traffic. Proxim Tsunami® includes sFlow® probe performing both random sampling of packets and time-based sampling of counters, then sending resulting datagrams to sFlow® monitoring server. It provides the data required to effectively control and manage network usage and gives complete visibility into the use of networks enabling performance optimization, accounting/billing for usage, and defense against security threats. Examples of the applications of sFlow data are:

   - Detecting, diagnosing, and fixing network problems
   - Real-time congestion management
   - Understanding application mix (eg P2P, Web, DNS etc) and changes
   - Usage accounting for billing and charge-back
   - Audit trail analysis to identify unauthorized network activity and trace the sources of denial-of-service attacks
   - Trending and capacity planning.

3. ### IEEE 1588v2 Precision Time Protocol

   Tsunami® 10100 operates in pass through mode for IEEE 1588v2 information in order to propagate clock information from the network core to its edge ensuring that all network components are properly synchronized on the same time reference with submicrosecond precision.

4. ### IPv4 and IPv6 Support

   IP addresses in Tsunami® devices can be configured in two modes.
   - IPv4: IPv4 is the widely used version of Internet Protocol defining the IP address in 32-bit in size.
   - IPv6: Ipv6 is the latest version of Internet Protocol with new addressing system for more IP addresses than IPv4.The IPv6 address is 128-bit in size.

5. ### Bandwidth Control

   Proxim's Proprietary WORP® allows service providers to control network bandwidth and to differentiate service offerings, additionally protecting the network from excessive use of the bandwidth by any one station.

6. ### Wide Operating Frequency

   Deploy from 5GHz frequency networks with the Tsunami® QuickBridge® 10100 with multiple channel widths of 20, 40 and 80MHz width.

## Conclusion

To overcome the backhaul challenges of existing 3G and 4G networks as well as the fast approaching 5G technology, the Tsunami® 10100 point to point radios are the best fit solutions for both the incumbent and small scale MNOs. The high performance Tsunami® 10100 consistently delivers without compromising on both reliability and speed. Additionally, the Tsunami® radios comes at a fraction of the cost of fiber lines and delivers high capacity backhauling even in NLoS conditions - where other wireless solutions such as Microwave are unable to deliver. For more information on the Tsunami® QuickBridge® product line please visit:
http://www.proxim.com/products/point-to-point-backhaul

## Company Profile

### Proxim Wireless: Performance Matters. Proxim Delivers.

Proxim Wireless is a pioneer and global leader in advanced Wi-Fi, point to point, and point to multipoint outdoor wireless systems that are purpose built for mission critical and high availability communications. With over 30 years of wireless experience, Proxim is recognized for its unparalleled reliability, superior performance and drive for innovation.

### Products and Markets

Marketed under the ORiNOCO® and Tsunami® brands, Proxim provides a comprehensive product line for a wide variety of market segments including enterprises, service providers, carriers, governments and municipalities, Wi-Fi Operators/Hot spot Operators and other organizations that need high performance, secure  scalable wireless solutions.

### Go to Market

Proxim serves customers through a global network of distributors, value-added resellers, system integrators and original equipment manufacturers. Our strong internal sales force also engages in direct-touch, consultative selling with major customers regardless of whether fulfillment is direct or via a channel partner. Our experienced system engineering team is available to provide professional services to both our channel partners and end customers.