Alcatel-Lucent 9500 Microwave Packet Radio (North American Markets)

Alcatel·Lucent

Streamlined, cost-effective microwave IP transformation

The Alcatel-Lucent 9500 Microwave Packet Radio (MPR) enables smooth transformation of backhaul networks from TDM to IP, providing efficient transport of multimedia traffic while supporting legacy TDM. It improves packet aggregation, increases bandwidth, optimizes Ethernet connectivity, and delivers the quality of service needed to satisfy end users. The Alcatel-Lucent 9500 MPR allows mobility, utility and public service providers to efficiently accommodate rapid growth in data and multimedia traffic because packets are handled natively and transmission is adapted to the propagation conditions and quality required by different types of services.

Meeting a key backhaul challenge – the rapid growth of multimedia traffic

To remain competitive in the rapidly changing mobile marketplace, operators need to deliver profitable new services while reducing backhaul costs. Users are expanding their demands beyond basic voice and data services like instant messaging and email; they want more delay-sensitive applications, such as media streaming and real-time multimedia. To support these services, broadband wireless technologies, including High-Speed Download Packet Access (HSDPA) and EVDO, are providing higher transmission speeds and packet interfaces.

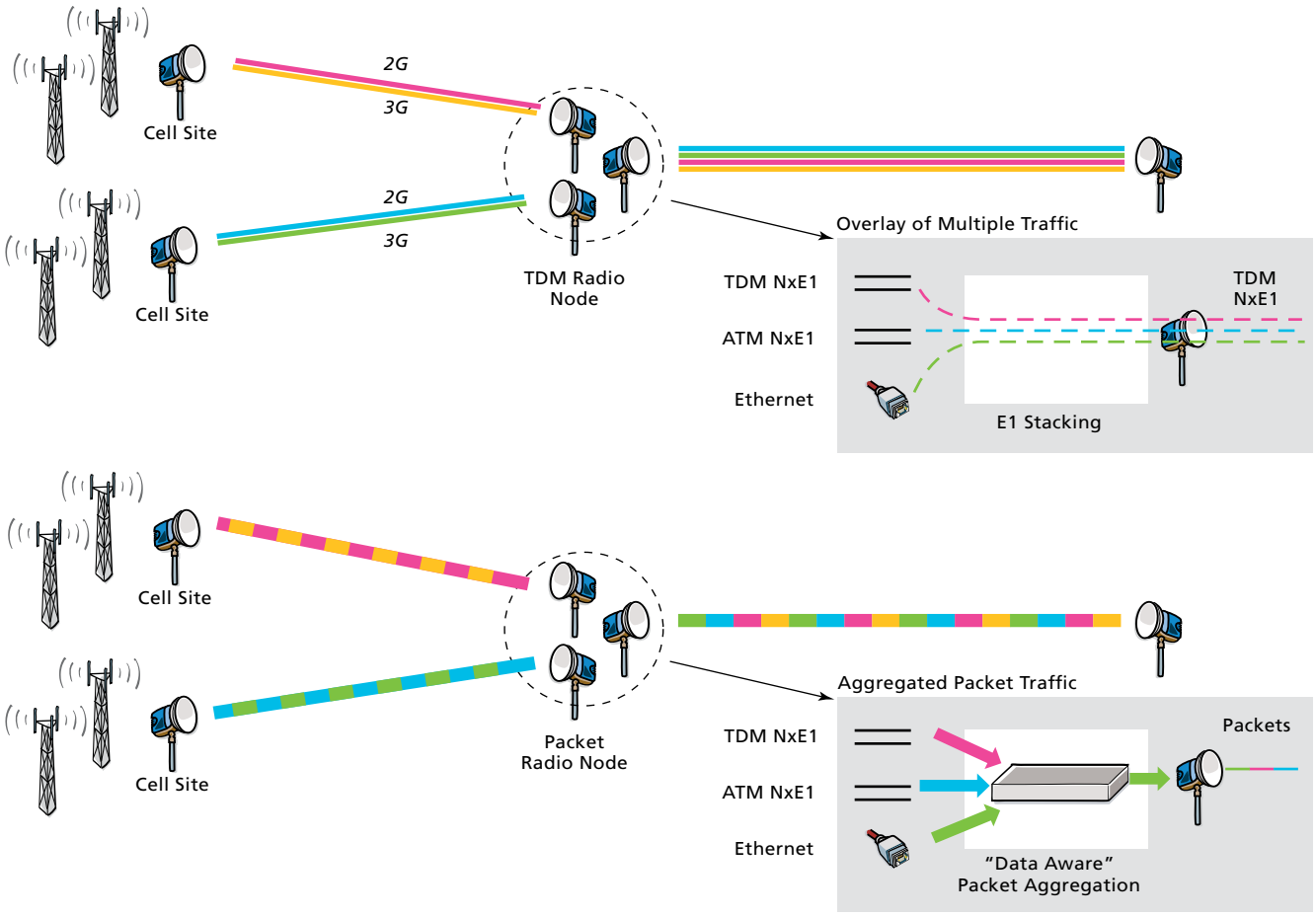
However, backhaul networks must also evolve to meet these new bandwidth demands at acceptable cost points. IP transport offers a valuable solution to help operators transform networks and better manage growing broadband traffic.

The Alcatel-Lucent 9500 MPR offers a revolutionary way of transporting packets natively. Using an innovative approach to deliver the quality of service required for each traffic type dramatically reduces operating expenditures (OPEX) and improves the connectivity of Ethernet and legacy T1 base stations. As a result, the network can easily and efficiently accommodate rapid growth in multimedia traffic, with smooth migration from TDM to IP.

Native transport of packet traffic produces a clear gain in scarce radio resources; while packet solutions can absorb TDM traffic efficiently, TDM solutions cannot handle packet traffic cost-effectively.

Figure 1 compares TDM transport and packet aggregation.

Figure 1. TDM transport versus packet aggregation



The need for IP transformation

The growing demand for new broadband services requires more connectivity and additional ports at cell sites. Packet traffic growth drives bandwidth requirements higher (20 Mb/s to 30 Mb/s per cell site); it also has different capacity and quality constraints than voice traffic

As mobile network infrastructure evolves, IP-native base stations will have Ethernet interfaces rather than T1. This change in physical interface brings new challenges to backhaul networks. Because the transition will not happen overnight, backhaul networks must migrate gracefully while supporting a mixed payload of legacy TDM and growing packet traffic.

The evolution of microwave radio from TDM to packet technologies enables data-aware transport, which can support new high-bandwidth services while leveraging existing technologies. IP transformation typically seeks to achieve four major goals:

- Gradual transformation of the network, focusing on areas where compelling events force investment in a solution
- Return on investment in less than two years (as a result of OPEX savings)
- Minimized OPEX despite capacity increases; requires optimizing the use of scarce resources and aggregating all services over a single pipe, with no overlays
- Use of a multi-vendor model with standard protocols and no proprietary equipment

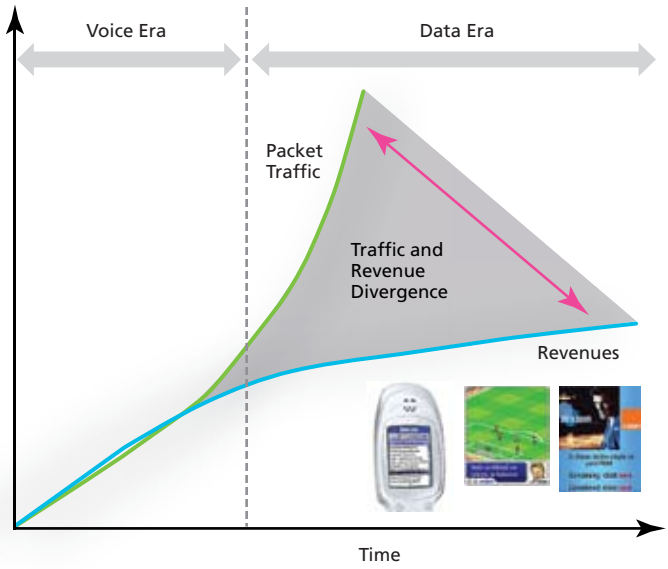
Data traffic is growing fast, but revenues are not increasing at the same pace; this creates a need to find more efficient ways to transport the additional packet traffic

Figure 2 shows the evolution of traffic and revenue.

IP TRANSFORMATION DRIVERS

- The need for additional connectivity to introduce new broadband technologies and services, such as HSDPA, EVDO, Wireless Fidelity (WiFi) hotspots, and Worldwide Interoperability for Microwave Access (WiMAX)
- Increased bandwidth requirements for new packet-based services (20 Mb/s to 30 Mb/s per cell site)
- Ethernet interfaces to eliminate the need for separate overlay networks to support Ethernet connectivity and backhaul

Figure 2. Traffic and revenue evolution with a massive introduction of broadband services



An innovative, truly packet product

The Alcatel-Lucent 9500 MPR helps ensure optimal performance for all types of backhauling technologies and enables smooth evolution of existing TDM-based networks to an all-IP network. It aggregates any kind of incoming traffic, including Second Generation (2G), Third Generation (3G) and WiMAX. Performance and low latency are improved for each service, and synchronization can be achieved along the entire backhauling network.

Service-aware transport

The Alcatel-Lucent 9500 MPR supports adaptive packet transport for exceptional use of the radio frequency (RF) spectrum and a dramatic improvement in broadband traffic transmission. This service-aware feature directly maps all traffic, both guaranteed and broadband, over the radio frame. It recognizes the traffic types in each incoming packet and automatically adapts to varying microwave link conditions. For instance, priority traffic, such as video and voice, are assigned to the most available packets across the radio link, while less time-dependent applications, such as Internet browsing and e-mail, are given access based on availability; this is shown in Figure 3.

Simplified growth

Because the Alcatel-Lucent 9500 MPR offers service-aware transport, operators can increase the number of active users without the inefficiencies of transport constraints. This system enables a dramatic increase in broadband users on the network; up to one hundred times that of T1-based TDM solutions. Operators also gain enhanced support for high-bandwidth applications, such as music downloading and streaming video.

As shown in Figure 4, packet solutions support more active voice and multimedia users than TDM solutions.

Figure 3. Adaptive packet radio

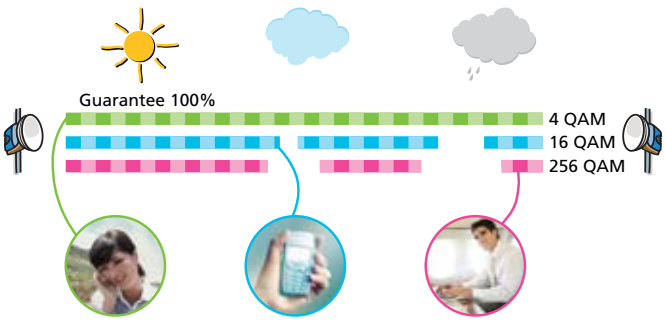
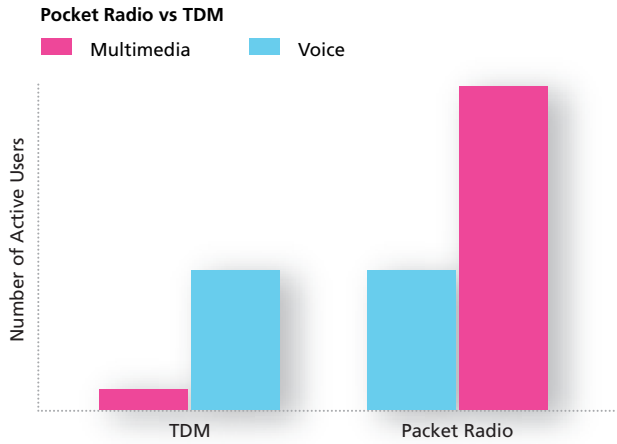


Figure 4. A comparison of TDM and packet radio solution capacity



Extending IP/MPLS from the core to the cell site

The Alcatel-Lucent 9500 MPR platform is part of an integrated end-to-end remote access network and core solution for complete IP transformation. Comprehensive monitoring of the entire IP remote access network helps ensure effective IP/Multi-Protocol Label Switching (MPLS) management and reduces complexity.

Key components

To integrate TDM, IP and microwave technologies, the Alcatel-Lucent 9500 MPR platform includes three main components.

The Microwave Service Switch

The Microwave Service Switch (MSS) can aggregate any kind of TDM traffic with any kind of packet traffic over a single Ethernet connection. Different services can be dynamically managed, depending on the existing radio performance levels, particularly in the case of fading conditions.

Microwave Packet Transport Unit – High Capacity, Long Haul

The Microwave Packet Transport Unit — High Capacity, Long Haul (MPT-HL) simplifies the critical part of a microwave system, using the latest RF and modem technology. It provides two RF slots in 2.5 rack units of space in 1+0, 1+1 Space Diversity/Frequency Diversity (SD/FD), and 2+0 installations. Connection to the MPT-HL from the MSS is simplified to a standard Gigabit Ethernet connection. The MPT-HL is the first all-packet, all-indoor nodal microwave transmission system.

Outdoor Unit

This same Outdoor Unit (ODU) is available for the whole product family (both traditional TDM and IP microwave solutions), allowing smooth migration from TDM to packet networks and protecting your initial investment.

The Alcatel-Lucent 9500 MPR is transparent to all microwave solutions, so it can be deployed in any existing network. This offers seamless, cost-effective evolution from TDM to packet transport — on the schedule that best meets your needs.

Microwave Service Switch

Microwave Packet Transport Unit

Outdoor Unit

Support services

Alcatel-Lucent offers a full range of support services for streamlined, cost-effective IP transformation, including:

- Network design and planning
- Hotline
- Repair and return express, swap and repair, and spare parts management
- On-site visits, urgent interventions and technical assistance
- Training
- Bundled services during warranty period and warranty extensions

Key features

FEATURE	BENEFIT
Multi-service aggregation layer	• Single transmission pipe for all services and access technologies • Radio bandwidth utilization is 100 percent (a significant improvement over TDM)
Service awareness	• Increased end-user satisfaction for all types of services • High performance with minimal bandwidth usage
Fully integrated multi-reach packet node	• Full switching, aggregation and handling of any incoming traffic • Virtually no capacity limits (up to 10 Gb/s) • No additional external switch is needed
Service-driven adaptive modulation	• Efficient use of scarce spectrum resources • Enhanced performance

The Alcatel-Lucent advantage

- Alcatel-Lucent is a leader in IP transformation and the migration to fully packet-based mobile networks; our revolutionary wireless transmission solutions provide the next-generation backhauling capabilities required to compete in today's marketplace
- Alcatel-Lucent is a leading vendor in microwave, IP and carrier Ethernet
  - ¬ We have shipped more than half a million microwave transceivers and have a presence in over 95 countries
  - ¬ We have more than 150 IP customers in over 65 countries, including 13 of the top 30 carriers globally
- The Alcatel-Lucent integrated, optimized packet aggregation solution is the first in the market; it is optimized to transport all types of services over a single pipe
- To maintain end-user satisfaction, Alcatel-Lucent:
  - ¬ Supports adaptive packet transport for unparalleled use of the radio frequency spectrum
  - ¬ Offers a dramatic improvement in broadband traffic transmission
  - ¬ Provides the required performance level for each service

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