

Alcatel-Lucent Mobile Backhaul Solution

Enabling the Profitable
Evolution to All-IP

Alcatel-Lucent 



A woman with dark curly hair is smiling and looking at a smartphone she is holding in her hands. The background is a blurred blue and white. There are decorative white dot patterns in the top left and bottom right corners of the page.

The mobile market is changing, and to remain competitive, mobile service providers and backhaul transport providers must deliver new services at lower cost. Mobile user demand continues to move beyond basic data services like instant messaging and email to more delay sensitive applications like streaming media and real-time multimedia. In response, broadband wireless technologies including high-speed packet access (HSPA) and evolution data optimized (EV-DO) are evolving to enable even higher transmission speeds and packet interfaces. Mobile transport networks must evolve to meet these new bandwidth demands and support 3G and 4G (LTE) mobile services profitably.



Mobile Transport Networks Under Pressure

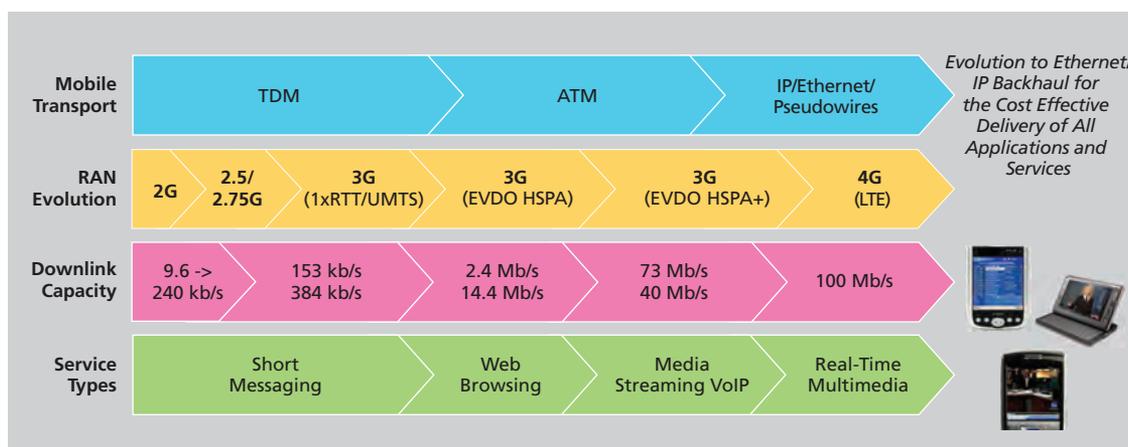
As more subscribers begin to adopt advanced, bandwidth intensive mobile data services, existing backhaul networks based on leased lines are strained to cost-effectively deliver increased capacity. As a result, service providers are challenged to evolve mobile transport networks to accommodate new packet-based services while simultaneously supporting traditional services.

As this evolution to packet occurs, service providers must meet or exceed the quality of experience that subscribers expect from voice, video, and data services. To do so, they must leverage existing network infrastructures and simultaneously transform their mobile transport networks to support packet-based traffic.

To meet business objectives and user demands, mobile transport networks must:

- Support current 2G/3G services while providing the scalability and flexibility to support new 4G/LTE mobile services
- Enable scalable bandwidth at lower cost (leveraging Ethernet/IP over multiple media: copper, fiber, microwave)
- Provide service assurance across all services (via carrier grade Ethernet/MPLS)
- Deliver accurate clock synchronization mechanisms to converge rapidly across the packet radio access network (RAN)
- Lower operations costs (via integrated management)

Figure 1. Evolution of the Radio Access Network (RAN) and Mobile Transport Network



A Comprehensive Solution for Mobile Transport Evolution

The Alcatel-Lucent Mobile Backhaul Solution is designed to help service providers meet these objectives and make a profitable transition to a more cost-effective mobile transport network infrastructure. It supports the delivery of new multimedia services and applications with stringent QoS requirements, and reduces costs in the mobile transport network — with an evolution path to all-IP.

This comprehensive solution for mobile transport evolution offers service providers the flexibility, reliability, and scalability they need to profitably migrate from time division multiplexing/plesiochronous digital hierarchy (TDM/PDH) mobile transport to all-IP supported by Ethernet.

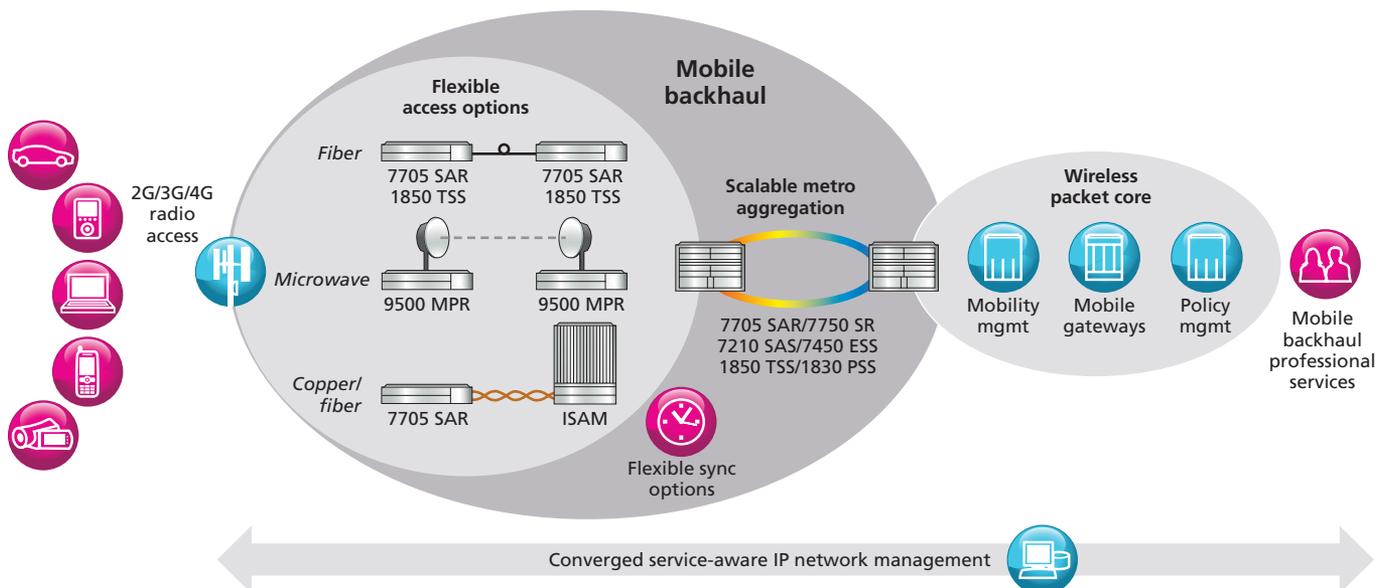
With unprecedented flexibility, the solution lets operators evolve at their own pace, supporting multiple backhaul alternatives, including Ethernet, IP/MPLS, packet optical, packet microwave, digital subscriber line (DSL) and gigabit passive optical network (GPON) with full Ethernet, ATM, TDM pseudowire support.

With this comprehensive approach, both mobile service providers and backhaul transport providers can cost-effectively transform their backhaul infrastructure from TDM/PDH to packet over copper, fiber or wireless at their own pace.

The Alcatel-Lucent Mobile Backhaul solution enables service providers to simplify operations via integrated network and service management. In this way it:

- Provides flexibility and scalability to support new, profitable 3G and 4G (LTE) mobile services
- Provides QoS support for all mobile services, efficiently allocating scarce network resources in real time
- Increases network optimization and capacity, improving cost per bit transported as leased lines are replaced
- Addresses infrastructure diversity via flexible backhaul alternatives, each providing an evolution to all-IP

Figure 2. Any G Mobile Backhaul – Efficient evolution to all-IP



Flexible Options for Customized Transformation

The Alcatel-Lucent Mobile Backhaul solution is designed to give service providers complete control over their network transformation. It can be tailored to meet diverse transport network strategies whether following a hybrid data offload approach or converging all services onto an IP-RAN.

The solution interworks with IP/MPLS and packet optical backbones to meet the reliability and service scaling requirements of next generation networks (NGN), IP multimedia subsystems (IMS) and IP-based services. By using a service router or transport service switch in the MTSO to interconnect mobile elements, service providers can optimize resources and networking flexibility of inter-element connections to drive costs out of the radio access network (RAN). For example, by using a service router combining the functions of an edge router and a Multi-Layer Switch (MLS), CDMA service providers can deploy a cost-effective and flexible solution requiring fewer devices while preparing the network for further mobile transport evolution.

Additional flexibility is provided by allowing service providers to take the capabilities of service routing and Carrier Ethernet transport to intermediate hub locations in the RAN. This allows a common, shared infrastructure to be used for all aggregated traffic between the hub and the MTSO. It also delivers significant leased line savings because Carrier Ethernet or optical connections can be used for backhaul.

The Alcatel-Lucent Mobile Backhaul solution provides additional benefits by extending MPLS and Ethernet aggregation towards the cell site. In the cell site there are opportunities for aggregation solutions that converge multi-generational traffic streams and/or adapt legacy base station interfaces onto packet transport infrastructures. Addressing a wide range of access alternatives, these include the 7705 SAR, 1850 TSS, or 9500 MPR. Additionally these solutions can help service providers by linking small clusters of base stations and grooming the traffic to reduce backhaul costs.





Multiple first mile transport options exist to transport traffic between the cell site and a hub. These include: DSL, GPON, fiber and microwave connections. Alcatel-Lucent's innovative DSL technologies are capable of supporting data speeds of 100s of megabits per second providing first mile connectivity where optical fibers are not available but copper pairs are. For base stations having optical fiber available, GPON can also provide a connectivity solution for backhaul. Both the DSL and GPON solutions, as enabled by the ISAM and SAR product families, leverage the deployments for triple play services to backhaul mobile traffic. The clock delivery capabilities of these solutions allow TDM/ATM leased lines to be completely replaced.

In areas where no fiber or copper alternatives are available at the cell site, service providers can utilize microwave access. This provides a quick and economical backhaul alternative. Ethernet enabled microwave access and aggregation capabilities optionally built into Alcatel-Lucent base stations provide a reduced footprint, optimized layout and cabling, faster installation time, and verified interoperability.

Through the implementation of Carrier Ethernet between the cell site and the MTSO, traffic can be aggregated efficiently and end-to-end service delivery upheld. For service providers evolving to packet-based backhaul, the combination of both Ethernet for reduced costs and MPLS for enhanced services delivery with reliability and QoS are essential to support all mobile services.

IP/MPLS and packet optical metro aggregation solutions optimize cost while providing unprecedented scale. They support 100G line rates and interworking across service routing and optical platforms in support of mobile, residential, and business services.

The Alcatel-Lucent Mobile Backhaul solution can also support multi-generational access via simultaneous support for TDM/PDH, SONET/SDH, multilink point-to-point protocol (MLPPP), ATM with ATM Inverse Multiplexing (IMA), Ethernet and IP as the access network evolves.

By supporting a variety of RAN traffic aggregation and backhaul technologies the solution enables cost effective transport of 2G/3G traffic while preparing the network for evolution to LTE.





Leveraging Existing Investments, Ethernet and MPLS

The goal of mobile transport network modernization is to enable new service delivery while lowering the cost of transport. The Alcatel-Lucent Mobile Backhaul solution leverages the optimal cost points of newer transport technologies including Carrier Ethernet and MPLS to help service providers prepare for the profound changes that long term evolution will bring.

A key component of the solution is a packet-optimized, data-aware transport infrastructure suitable for the full range of legacy and new services. This infrastructure will need to support different QoS requirements (i.e., delay), depending on the application.

To meet the stringent QoS requirements of real-time traffic, the mobile transport network must integrate many of the qualities and attributes of switched networks: predictability, reliability and manageability. The implementation of MPLS within the Alcatel-Lucent Mobile Backhaul solution provides the QoS, traffic engineering and management capabilities necessary to support all mobile services as well as business applications and consumer Internet services over an IP network.

Rather than using multiple overlay backhaul networks, Alcatel-Lucent solution can accommodate legacy access needs and be optimized for next generation broadband services using Ethernet and MPLS, based on multi-service routing and switching platforms. The use of Ethernet/ATM/TDM-based pseudowires brings mature and efficient functionality to the RAN and enables transition of the legacy RAN to packet.

Figure3. Multiple QoS Requirements

Service	Delay Budget
HDTV	Low
Broadcast TV	Low
High-speed Internet	High
Low-speed Internet	High
Person-to-person video	Low
VoIP	Low
SMS	High



Integrated Network and Service Management

The mobile RAN and transport network is characterized by rapid growth as well as a diversity of access types. As mobile networks grow, a continuous rebalancing of the RAN and transport network can have a major impact on the cost of network ownership, as the network is modified to accommodate changes in capacity requirements. To support this critical business activity, strong network management tools and processes are needed to control operating expenses.

Network management in the Alcatel-Lucent Mobile Backhaul solution is provided by the Alcatel-Lucent 5620 management portfolio supporting Alcatel-Lucent's converged IP, Ethernet and MPLS portfolio inclusive of cell sites having microwave access via the Alcatel-Lucent 9500 Microwave Packet Radio (MPR). As part of this portfolio, the 5620 Service Aware Manager (SAM) enables provisioning of an end-to-end service using wizards or point-and-click configuration from a single application without having to individually configure each device in the service path. It greatly reduces the complexity and risk associated with provisioning complex services, and provides comprehensive support for fault, configuration, accounting, performance and security.

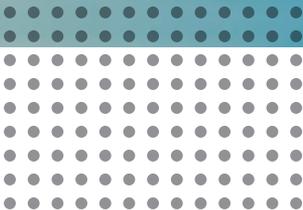


The management system of a transformed mobile transport network must have the capability to understand the hierarchy of end-to-end service construction. With this service awareness the management system can react to individual nodal and composite service events and present correlated, relational information to the operator. This enables faster service provisioning, verification and restoration.

Management of optical and microwave transport systems in the Alcatel-Lucent Mobile Backhaul solution is provided by the Alcatel-Lucent 1350 Optical Management System (OMS), a comprehensive set of applications, bundled according to the transport network solutions managed (e.g., connectivity services based on Ethernet, MPLS-TP, SDH/SONET, and WDM technologies).

This complete solution allows mobile service providers and backhaul transport providers to manage multi-technology, multi-service networks that integrate current and next-generation transport technologies with emerging data traffic like metro Ethernet.

The Alcatel-Lucent 5520 Access Management System (AMS) supports the ISAM family of Alcatel-Lucent access nodes. It provides all management requirements for provisioning, maintaining and troubleshooting access networks with the necessary means for enabling smooth integration into the service provider's OSS environment. In addition, the product provides a set of productivity tools that drastically increase the operator's efficiency.



Backed By Experience and Professional Services

Successful transformation requires special emphasis on end-to-end service delivery. This requires a services integrator who understands the requirements of the new mobile transport network and can effectively integrate all components. Alcatel-Lucent backs the Mobile Backhaul solution with extensive experience and comprehensive professional services.

As a leader in developing and delivering 2G/3G and LTE networks, broadband wireless access, and carrier-grade packet optical and IP/MPLS networks, Alcatel-Lucent is the ideal mobile network transformation partner.

Today, Alcatel-Lucent is setting the standard for IP network transformation based on a vision, portfolio and commitment to deliver next-generation, user-centric solutions. As the world leader in IP network transformation, Alcatel-Lucent provides mobile service providers and backhaul transport providers with a wealth of industry thought leadership and services integration experience for:

- Consultation on service transformation
- Integration of carrier-grade solutions across multiple vendors and telecom domains
- OSS/BSS and security integration
- Support for policy-driven security, QoS, blending and personalization approaches
- Skills and resources for rapid development and deployment of high-value technologies and services
- Extensive operations and maintenance services

This complete, integrated approach allows mobile operators to ensure their networks are ready to address the needs of their customers. It enables them to launch a broad variety of profitable new, IP-based services and blend them with already available services.





Backhaul Solution Alcatel-Lucent Leadership

Industry-leading solutions portfolio for mobile network transformation to all-IP

- Fixed and wireless market leadership in IP transformation deployments worldwide
 - Proven DSL and GPON technology and broadband access platforms marketing leader
 - Global market leader in optical networking — superior WDM and multi-service optical transport platforms
 - High performance service routing IP/MPLS and Carrier Ethernet platforms
 - Leader in CDMA and LTE networks and demonstrated leadership in microwave transmission technology

Standards and technology leadership

- Industry leading Carrier Ethernet OAM solutions
- Recognized within the industry for MPLS deployments and innovation

End-to-end fixed and wireless network transformation expertise

- Trusted partner in the world's largest network transformation projects with one of the most expansive and experienced global services teams offering comprehensive design, deployment, integration and management services

Recognized vision and innovation

- Renowned research and development with world-class Bell Labs research and patented innovation

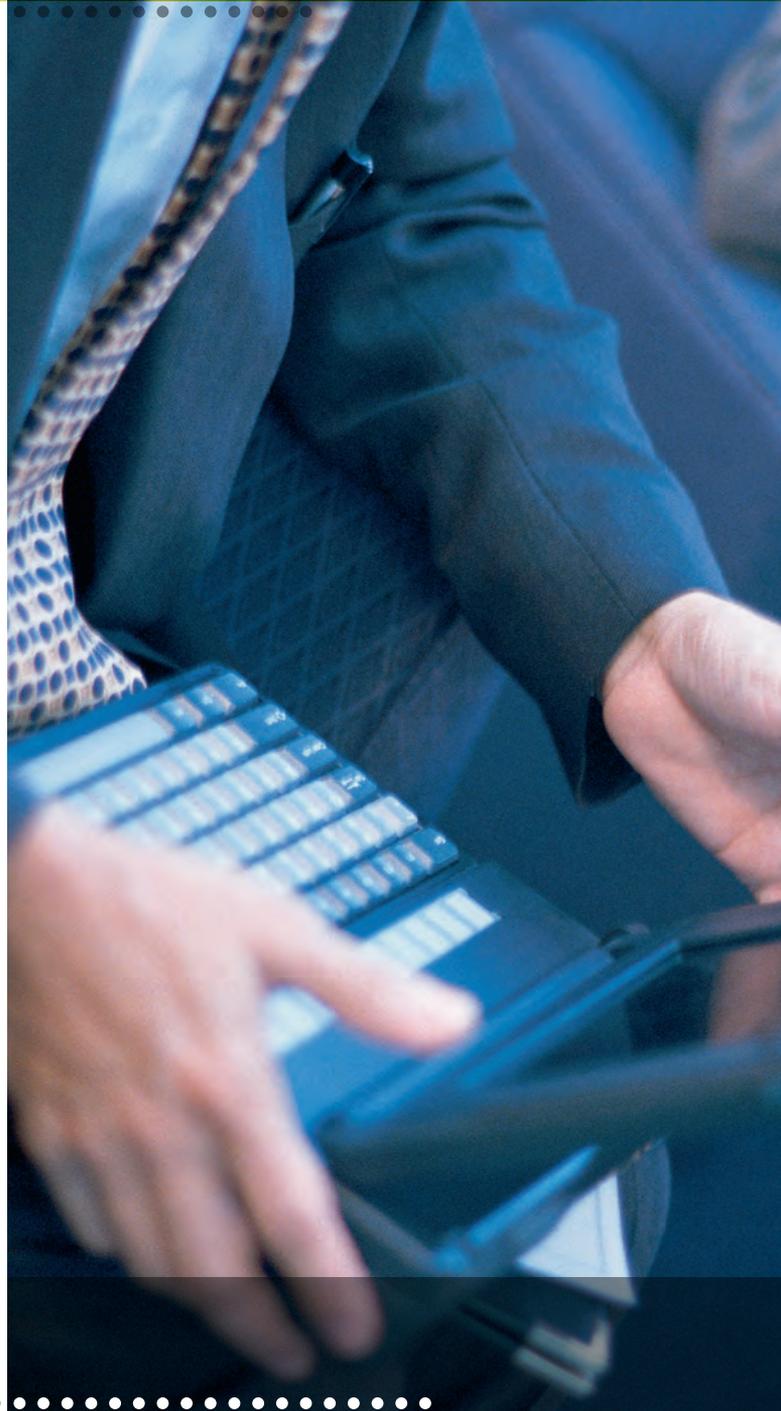
Table 1. Alcatel-Lucent Mobile Backhaul Solution Components

APPLICATION	Cell Site	Aggregation Hub	Central Hub / MTSO
IP/MPLS Backhaul	7705 SAR-M, 7705 SAR-F, 7705 SAR-8, 7210 SAS-D	7705 SAR-8, 7705 SAR-18, 7210 SAS, 7450 ESS, 7710 SR	7750 SR, 7450 ESS
Broadband Backhaul	7342 FTU ONT family, Cell pipe ADSL2+Modem, and 7705 SAR	7302 ISAM, 7330 FTTN ISAM, 7342 FTU ISAM	7710 SR, 1850 TSS, 7750 SR
Packet Optical Backhaul	Packet Transport: 1850 TSS-3/TSS-5	Packet Transport: 1850 TSS-40/TSS-100 WDM: 1830 PSS	Packet Transport: 1850 TSS-320/160 WDM: 1830 PSS
Microwave Backhaul	9500 MPR, 9500 MPR-e	9500 MXC, 9500 MPR, 9500 MPR-e	MDR 8000, 9600 LSY
Service, Network and Element Management	←	5620 SAM, 1350 OMS, 5520 AMS	→

Alcatel-Lucent Mobile Backhaul Solution Benefits

- Delivers a comprehensive integrated solution, unmatched in the industry, for evolving 2G / 3G / 4G mobile transport networks to all-IP.
- Offers flexible backhaul evolution by supporting any access: Ethernet, IP/MPLS, packet optical, DSL, GPON and packet microwave with full Ethernet/ATM/TDM pseudowire support.
- Provides IP service aware solution for high bandwidth, low latency differentiated services.
- Increases network optimization and capacity, improving cost per bit transported.
- Provides end-to-end IP network management & IP policy solution for cell site access, aggregation, and wireless packet core.
- Fully supported by a world-class, comprehensive portfolio of professional services with expertise in managing the complexities of mobile transport network transformation.

To learn more about our comprehensive solutions, please contact your Alcatel-Lucent Sales Representative. Visit our web site at: <http://www.alcatel-lucent.com>.



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