

Increasing Revenue by Delivering Cellular Backhaul Services



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Most revenues for cellular backhaul right now are going to incumbent carriers, but cable operators are well positioned to participate in this high-growth market. They can offer cellular backhaul services that are easy to deliver and manage — and that take advantage of existing optical core networks.

By deploying fiber-based Ethernet access network products for transporting cellular services from a wireless base station or cell tower to the cable headend, cable operators can offer wireless carriers a more cost-effective solution with enhanced scalability. Cable operators therefore can potentially capture new revenue streams and begin building new partnerships with cellular providers. This white paper provides an overview of the cellular backhaul business opportunity in North America, and shows how cable operators can deliver profitable cellular backhaul services.

THE MARKET OPPORTUNITY

“Cellular backhaul” refers to the means by which voice and data traffic are carried from the cell tower back to central switches so that they can be delivered to the wireless carrier’s network.

There is a tremendous market opportunity for cable operators. Current cellular backhaul expenditures by U.S. cellular carriers are approximately \$2 billion. Today, most cellular backhaul traffic is carried over T1 lines, which are 1.544 Mbps symmetrical copper telco cable. Multiple voice calls and data sessions can be carried over a single T1 circuit, but they are slow to provision and do not scale well. The T1 lines are typically supplied by the Incumbent Local Exchange Carrier (ILEC).

Cellular operators feel the pain of providing backhaul services. Current industry data indicates that cellular backhaul operating expenses account for up to 30–40 percent of a wireless carrier’s total operating expense. Many wireless providers have up to four T1s per base station now, and plan to increase to up to 12 in the near future.

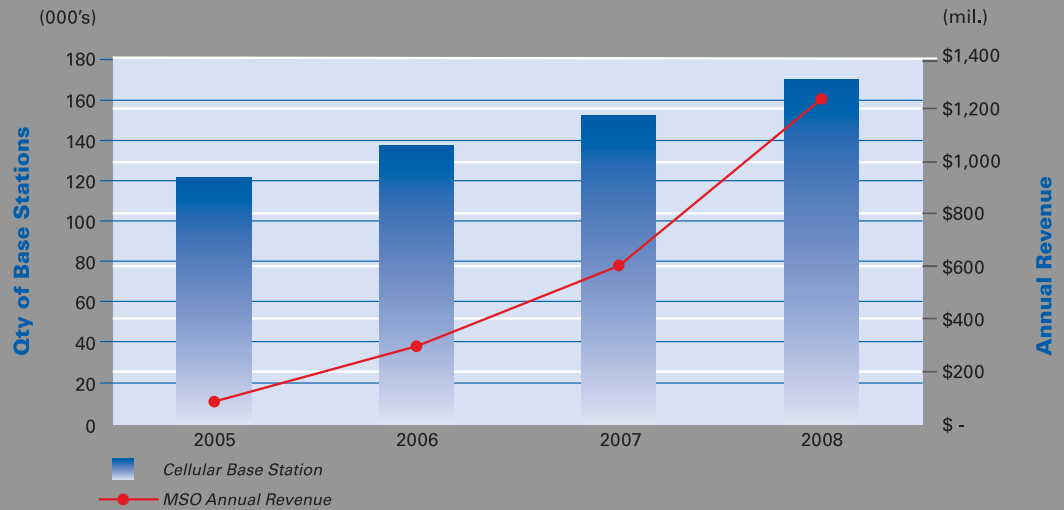
This means that higher bandwidth is needed and scalability is crucial. Both of these trends are particularly important to cable operators, since approximately 178,000 cellular base stations now operate in the U.S. alone.

Cellular base stations of the future are migrating toward an IP/Ethernet interface instead of the traditional T1 approach that relies on legacy Time Division Multiplexing (TDM) to allocate fixed channels for transmission.

The use of wireless services continues to grow, which of course drives the increase in cellular backhaul services. Since most cellular providers already have traditional T1 connections to cell towers, new solutions are needed that support both IP/Ethernet and T1 services.

The demand for cellular backhaul services is augmented by the fact that operators seek a redundant backhaul path to maximize base station utilization. They therefore currently often pay ILECs for 2 T1s to carry a single T1 payload.

Figure 1. Cable operators supporting cellular backhaul have a major opportunity to increase revenues.



New, fiber-based cellular backhaul solutions now allow cable operators to deploy a single device in a cell tower to support both IP/Ethernet and T1 services. This allows them to meet existing needs to backhaul T1 circuits, while also meeting emerging needs to backhaul IP/Ethernet traffic.

ATTRACTING CELLULAR PROVIDERS

Cable operators can construct a compelling value proposition that encourages growth in cellular backhaul services. T1 services offer limited scalability, since each T1 is 1.544 Mbps. The use of high-speed Ethernet is far more attractive, since cable operators can offer services that scale up to 1000 Mbps via a single connection.

By offering concurrent support for T1 and Gigabit Ethernet backhaul services, cable operators can give cellular operators the flexibility to maintain current T1 services while deploying lower-cost and more scalable IP/Ethernet services in the future. Cable operators can offer more flexible scalability, and can allow cellular providers to provision bandwidth much faster than through provisioning additional T1 lines from the ILEC.

This means a faster time-to-revenue for cellular providers. Since cable operators are leveraging existing optical backbone and access infrastructure, their incremental costs to deliver backhaul services are lower than ILEC costs — and this fact can be reflected in the price.

Cellular providers relying on cable operators for cellular backhaul can expand to offer additional

services. For example, a wireless carrier fleshing out the opportunity to offer wireless data services in a community could deploy Worldwide Interoperability for Microwave Access (WiMAX) broadband wireless services and backhaul the traffic over the fiber network.

Cable operators can either pursue offering primary backhaul services or offer the redundant services that complement ILEC services. Cellular providers can rely on cable operators for attractive cellular backhaul services that allow them to drive down their operational costs while accelerating revenue recognition and enabling new services.

FIBER-BASED CELLULAR BACKHAUL SOLUTIONS FROM MOTOROLA

Motorola provides the fiber-based equipment that allows cable operators to attract cellular providers with competitively priced and scalable backhaul services. Motorola's Multiservice Enterprise Access (MEA) suite is a flexible family of access products designed to enable operators to cost-effectively deliver traditional TDM telephony and high-speed Ethernet data services to commercial customers.

A unified access solution built specifically with issues such as cost, reliability, and simplicity in mind, the MEA products provide intelligent multi-service aggregation capabilities in a compact footprint, with industry-leading levels of interface, media, and topology flexibility. The innovative MEA product architecture supports standard Ethernet (10/100Base-T, 100Base-FX, 1000Base-SX, or LX) ports as well as toll-quality

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Cable operators can deploy Motorola's MEA platform as a cost-effective method for potentially capturing significant new revenue streams.

MEA PLATFORM HIGHLIGHTS

- Two product families: MEA-240H and MEA-120
- Flexible deployment architectures
- Fiber-based access transport
- Managed demarcation
- Wall, shelf or rack-mounted units for base stations
- Low latency
- Modular, rack-mounted chassis for hub locations
- Ethernet plus TDM

TDM T1 service/user interfaces. This flexibility enables network operators to reach a broader business market with a variety of revenue-generating services. Operators can offer cellular backhaul services by deploying an MEA-240H on the regional optical network and MEA-120s at the cellular base stations.

MEA-240H. The modular, rack-mountable MEA-240H is a carrier-class platform that provides a total of 16 universal slots for service interface modules, four slots for future aggregation modules, 1+1 redundant CPU modules, and redundant, field-replaceable power supplies. This compact (5RU) chassis has the ability to terminate and originate multiple applications and topologies within the same shelf, maximizing valuable rack space. It is typically deployed in the headend to consolidate business access or cellular backhaul services. The MEA-240H supports up to 64 T1/E1s and up to 16 Gigabit Ethernet connections. Traffic from multiple wireless base stations can feed onto a single MEA-240H for access to the high-speed optical network for backhauling voice and data services.

MEA-120. Ideally suited for deployment as Customer Premises Equipment (CPE), the standalone MEA-120F and rack-mountable MEA-120G leverage the same architecture as the larger MEA-240H system in an ultra-compact shelf, rack, or wall-mountable device. Available in a variety of fixed configurations, the MEA-120 supports both 100 Mbps and 1 Gbps Ethernet and T1/E1 user interface ports. The rack-mounted MEA-120G also has the capability for redundant power supplies in both AC and DC applications. Cable operators can deploy the MEA-120G in cellular base stations to provide scalable optical access to the cable network.

DEPLOYING CELLULAR BACKHAUL SERVICES

Cable operators can deploy an MEA-240H in a distribution hub, and a single MEA-240H could aggregate voice and data traffic from MEA-120Gs located in base stations and from MEA-120Gs and/or MEA-120Fs delivering commercial services to enterprise customers. Because the MEA-240H supports scalable growth, interface cards can be added as needed to support market demands.

In comparing MEA equipment costs, it is helpful to review the three typical deployment configurations:

- With short-reach optics (<15 km of fiber)
- With mid-range optics (16–40 km of fiber)
- With Course Wavelength Division Multiplexing (CWDM) optics to allow for an 8:1 concentration in fiber.

Motorola offers Small Form-factor Pluggable (SFP) optical modules so that operators can optimize deployments. The use of modular optics instead of fixed optics reduces the space and expense of sparing requirements. This modular approach also allows greater flexibility, so operators can deploy the same product in multiple applications and network topologies.

Cable operators can rack-mount one or more MEA-120Gs in the equipment room of a wireless base station. Each MEA-120G supports up to four T1s and Gigabit Ethernet. Support for both TDM and IP allows cable operators to provide maximum flexibility. Wireless operators can turn to cable operators to backhaul existing T1 traffic, and can migrate to Ethernet backhaul over IP services to reduce the cost of services in the future.



Cable operators can consolidate cellular backhaul and commercial services using the MEA-240H.



The MEA-120G can be deployed in cellular base stations to support both T1 and IP backhaul services.



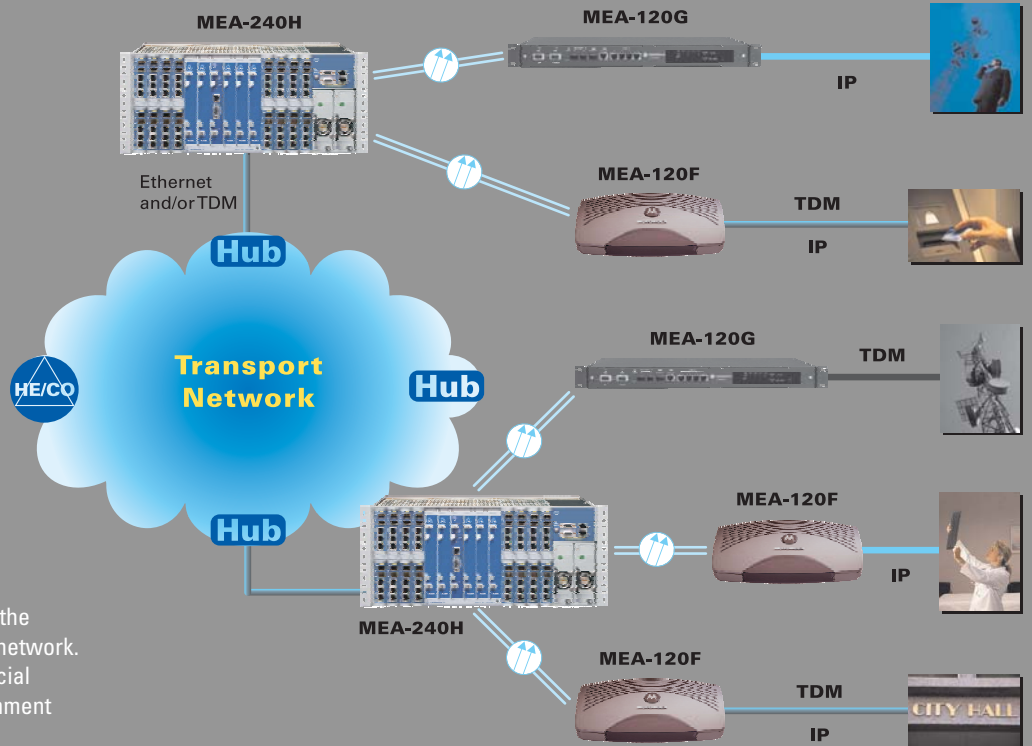


Figure 2. Cellular traffic is backhauled to the MEA-240H for transport over the optical network. The MEA-240H also aggregates commercial services traffic from enterprise or government locations.

With MEA-120Gs rack-mounted in each tower to backhaul the cellular traffic and wireless providers feeding high-speed IP/Ethernet traffic into a 1000Base Gigabit Ethernet port, cable operators can offer full-rate Gigabit Ethernet plus 4 T1s. All traffic is backhauled to the MEA-240H via optical Gigabit Ethernet connections. This solution allows cable operators to provide layer one transport from the cell tower for handoff to the wireless provider.

Because of the MEA platform architecture, cable operators can deploy an MEA-240H on the regional network to support both cellular backhaul and commercial services. Adding a new cell tower requires only the deployment of MEA-120Gs and the easy provisioning of the service. The MEA platforms can be centrally managed. The MEA Enterprise Management System (EMS) allows cable operators to manage both central and remote MEA platforms. It includes provisioning and configuration tools and provides network and shelf views.

DELIVERING CELLULAR BACKHAUL SERVICES
 Cable operators are well positioned to offer appealing cellular backhaul services. The risk/reward for offering these services is extremely compelling. Cable operators can extend their existing network infrastructure without any major changes just by adding an MEA-240H in a distribution hub and one or more MEA-120Gs at each wireless base station that has purchased the service. Cable operators can therefore potentially realize additional revenues with relatively minimal investments in equipment and resources, and can create ongoing revenue streams from wholesale backhaul services.

Motorola offers fiber-based cellular backhaul solutions that can help cable operators to increase revenues with relatively minimal incremental investments. At a time when wireless carriers are struggling to better manage backhaul costs, cable operators can offer cellular backhaul services that may assist in capturing business from ILECs and potentially lead to strong and lasting relationships with cellular carriers.

Cable operators can leverage the MEA family to compete with incumbent providers for backhauling cellular voice and data from base stations to the regional infrastructure. The MEA platform provides the following major benefits for operators deploying cellular backhaul services:

Low initial cost and low incremental cost per customer. The MEA platforms help enable success-based deployment. The initial capital outlay for the first customer is very small. The additional equipment cost for customers 2–16 is very low.

Same platform, same CPE for TDM or Ethernet applications. Whether the customer wants 100 Mbps data service, T1 services, or a combination of both, operators can support commercial customers by relying on the MEA. This approach simplifies sparing and creates opportunities to up-sell both data and T1 services without changing the MEA equipment at the customer premises or at the headend.

Modular optics for greater flexibility. The use of SFP optical modules in the platforms allows the operator to change the optical configuration of the link without changing CPE or headend equipment. For example, the first customer in a given area could be deployed with 1310 nm optics for a lower cost, and then be transitioned to CWDM once more customers in the same area are captured. An additional benefit is the ability to add a diverse path link simply by inserting additional SFP modules.

Managed demarcation with loopback capability. The MEA platform is remotely managed. The CPE and the MEA equipment are in constant communication. This

functionality not only allows element management, but also provisioning and troubleshooting via loopback capability. With this capability, an operator can determine how best to manage issues prior to dispatching a technician.

Full Ethernet payload plus four T1s. MSOs can offer 1000 Mbps of Ethernet data plus up to four T1 (DS1) circuits over the fiber link. This differentiates the MEA from alternative products that package the TDM into IP packets that then take up valuable Ethernet payload. This simplicity also eliminates the need to configure switches at the customer site, and because there are no switches the latency of the signals is reduced.

IP Voice and Data Solutions from Motorola

Cable operators can leverage existing network infrastructure and add MEA platforms to economically offer commercial voice, data, and video services to enterprise customers. Motorola also provides the infrastructure and core equipment to build end-to-end voice and data solutions, as well as the professional services expertise that can help operators build and manage carrier-class commercial services offerings.

For more information on the MEA suite of products, please visit <http://broadband.motorola.com/ips>



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