EXECUTIVE SUMMARY

Carrier Ethernet is beginning to play a role in every part of the metro and access network infrastructure – creating new challenges and opportunities for well-established data and optical networking equipment vendors, as well as startups looking to meet demand for new Ethernet solutions. The emergence of carrier features on new and old network equipment is helping fuel enterprise interest in Ethernet services today and will ultimately help accelerate the rise of Ethernet at the expense of legacy services.

Meanwhile, more and more service providers are embracing carrier Ethernet as a critical service and network convergence technology, useful for addressing a range of enterprise, residential, and mobile applications. Indeed, the same type of carrier Ethernet platforms that address tough enterprise service requirements can also be used to build networks with the high scaleability and low latency required to support residential triple-play offerings. And carrier Ethernet’s ability to provide guaranteed quality of service (QOS), flexible service-level agreements (SLAs), and seamless integration with wireline networks makes it useful for addressing 3G/UMTS wireless backhaul requirements, as well.

Carrier Ethernet Equipment Market Outlook explores the emergence of carrier-grade Ethernet platforms, identifies the key service and infrastructure drivers generating momentum for carrier Ethernet, and describes the Ethernet strategies of the industry’s leading equipment vendors. The report delivers in-depth profiles of equipment vendors that sell a particular set of solutions that lie at the heart of the market: carrier Ethernet switch/routers. These platforms are principally used to support Ethernet-based enterprise and residential services and generally meet the five basic carrier Ethernet feature requirements established by the Metro Ethernet Forum (MEF) in consultation with other industry standards bodies (see Excerpt 1).

Excerpt 1: Carrier Ethernet Feature Highlights & Standards

<table>
<thead>
<tr>
<th>FEATURE</th>
<th>FEATURE HIGHLIGHTS</th>
<th>METRO ETHERNET FORUM STANDARD</th>
<th>OTHER STANDARDS</th>
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<tbody>
<tr>
<td>Protection</td>
<td>&lt; 50ms restoration</td>
<td>MEF 2: Ethernet Protection</td>
<td>IETF: MPLS Fast Reroute</td>
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<td></td>
<td>End-to-end path protection</td>
<td>MEF 4: Architecture Framework</td>
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<td></td>
<td>Aggregated line/node protection</td>
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<tr>
<td>Hard Quality of Service</td>
<td>Guaranteed end-to-end SLA</td>
<td>MEF 6: Service Definition</td>
<td>N/A</td>
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<tr>
<td>(QOS)</td>
<td>Connection-oriented</td>
<td>MEF 10: Service Attributes</td>
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<td></td>
<td>End-to-end CIR and EIR</td>
<td>Service Attributes II*</td>
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<td>Service Attributes Testing*</td>
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<td>Service Definition II*</td>
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FEATURE | FEATURE HIGHLIGHTS | METRO ETHERNET FORUM STANDARD | OTHER STANDARDS
--- | --- | --- | ---
TDM Support | Seamless integration of TDM Circuit emulation services Support for voice applications | MEF 3: CES Framework MEF 8: CES Implementation MEF TDM Testing* | N/A
Service Management | Rapid service creation Robust OAM capabilities Customer network management Integration of third-party platforms | MEF 7: EMS and NMS Info MEF OAM Framework* MEF Performance Monitoring* MEF NE Management* | IEEE 802.1 ITU Study Group 13
Scaleability | 100,000s of EVCs No VLAN limitation Mbit/s to n x 10 Gbit/s | MEF 9: UNI Testing MEF 11: UNI Framework MEF UNI I 1A* MEF UNI Type II* MEF Ethernet Aggregation* | IEEE 802.1

Source: Metro Ethernet Forum
* Standard not yet ratified by the MEF.

The analysis in this report is based on in-depth conversations with a full range of Ethernet equipment vendors, as well as direct interviews and other data gathered from more than two dozen network operators now providing Ethernet services.

For a list of carrier Ethernet equipment vendors covered in this report, click here.

For a list of network operators interviewed and analyzed for this report, click here.

Hundreds of operators worldwide now offer more than 1,000 Ethernet connectivity and Ethernet-access-based services, and new services and capabilities are rapidly being introduced. All types of enterprises – including financial, health care, manufacturing, consumer-oriented, legal, educational, and government institutions – have enthusiastically embraced Ethernet. Heavy Reading surveys of enterprise users indicate demand for Ethernet and IP VPN services has the potential to be greater than that for any other carrier-delivered data service. In fact, demand is so strong that the biggest complaint we've heard from enterprises in our survey feedback is that they would love to buy Ethernet services but are having trouble getting them at all the necessary locations.

Enterprise enthusiasm has translated into booming sales for Ethernet connectivity and Ethernet-access-based services worldwide – not just in Asia, where Ethernet first took hold in the carrier space. A wide variety of U.S. operators interviewed by Heavy Reading stated that their Ethernet services revenue grew strongly in 2004, and they expect more of the same in 2005. Several carriers told Heavy Reading in the second quarter of 2005 that they had already blown past their 2005 Ethernet revenue targets and had to reset the bar for the rest of the year. Based on this feedback and what we've heard elsewhere on the international front, we fully expect to see strong double-digit revenue growth for Ethernet services worldwide for at least the next several years.

Report Scope and Structure

Carrier Ethernet Equipment Market Outlook offers the most complete accounting now available of the carrier Ethernet switch/router sector, including in-depth competitive analyses of vendor product lines and strategies. Using Heavy Reading’s established Ethernet equipment product taxonomy, the report provides a clear roadmap for delineating the carrier Ethernet market sector – of benefit to systems vendors, their components suppliers, and network operators.
Excerpt 2: Focus – Carrier Ethernet Switch/Router

The report is structured as follows:

**Section I** is an introduction to the report, with complete report key findings.

**Section II** examines the emergence of carrier Ethernet platforms and describes the major features that distinguish these more robust products from their predecessors. This section focuses on the technology trends and the uses of new carrier Ethernet products, rather than individual vendor solutions.

**Section III** presents *Heavy Reading's* Ethernet Taxonomy and highlights the specific set of products that lie at the heart of the carrier Ethernet market: carrier Ethernet switches/routers.

**Section IV** explains why *Heavy Reading* believes the carrier Ethernet equipment market is beginning to boom by exploring the critical role carrier Ethernet promises to play in both service and network convergence. This section focuses on the shift toward carrier Ethernet services for enterprises, which is fueling increased service provider spending on high-performance Ethernet platforms. We then examine why carrier Ethernet is also emerging as a major convergence technology supporting residential triple play and, to a lesser extent, wireless backhaul applications.

**Section V** discusses the Ethernet strategies of 17 equipment vendors, primarily as they relate to carrier Ethernet switch/router solutions. *Heavy Reading* also provides detailed profiles on 10 of these vendors that are currently shipping or are very close to shipping carrier Ethernet switch/router platforms. The profiles include analyses of carrier Ethernet switch/router vendor strategies, product portfolios, recent product developments, and customer activity.

**Section VI** provides some concluding thoughts on the overall carrier Ethernet market and recommendations to help carrier Ethernet switch/router vendors navigate the market.

The report is essential reading for a wide range of industry participants, including the following:

- **Telecom equipment manufacturers**: How does your Ethernet product portfolio match up to your competition? What competitive advantages can you exploit in your marketing efforts? What are the potential weaknesses in your product line that need to be addressed?

- **Components vendors**: Where are systems vendors headed with their carrier Ethernet switch/router product development plans? How does your portfolio match up with those plans? Which systems manufacturers should you be targeting with your products?
• **Network operators:** How is the carrier Ethernet equipment market evolving, and how can you take advantage that evolution? Which suppliers are in the best position to deliver carrier Ethernet solutions not only today, but in years to come?

• **Investors:** Which technology suppliers are in the best position to capture market share in this telecom industry sector? How fast will the carrier Ethernet sector continue to grow, and how sustainable is that growth?

**Carrier Ethernet Equipment Market Outlook** adds to previous Heavy Reading research analyzing the evolution of Ethernet capabilities on a variety of products, as well as the evolving role that Ethernet is playing in service provider networks. These reports include: *The Future of Multiservice Switching in Converged IP/MPLS Networks*, *IPTV and the Future of Telecom Video Network Architectures*, *ROADMs and the Future of Metro Optical Networks*, *Pseudowires and the Future of Transport and Access Networks*, and *The Future of Sonet/SDH*.

Carrier Ethernet services have been specifically examined in *Ethernet Services Carrier Scorecard: North America*, *Ethernet Services in China*, and *Carrier Ethernet Services: Who’s Doing What*.

Upcoming reports will continue to address other aspects of the Ethernet equipment and services sectors, including the Ethernet-over-optical equipment market and Ethernet service deployments in Europe and Asia/Pacific.

**Carrier Ethernet Equipment Market Outlook** is published in PDF format.