Welcome to Comcast Business Ethernet. We are committed to providing you with high quality services and superior customer support. This guide includes key information about your Ethernet services, along with the most frequently asked questions.

GETTING STARTED WITH COMCAST SERVICE

Your service is installed, but not yet turned up. You have a five day period after installation to internally test the circuit. After the five days, billing will start. When you are ready, please notify your Customer Project Manager (PM) or call our Test and Turn-Up Group at 877-666-8124 to schedule your system turn-up. The Test and Turn-Up Team is available Monday through Friday from 8 AM to 1 AM, EST. Comcast must be notified prior to turn-up to ensure the proper operation of your newly installed service(s).

COMCAST ETHERNET CONFIGURATION RECOMMENDATIONS

Please review the following common configurations to optimize performance.

Traffic Shaping & Prioritization

- Your equipment should be configured to shape traffic to the Committed Information Rate (CIR) of the circuit. For example, if your Comcast Business Ethernet service includes a 50 Mbps circuit, the traffic shaping should be configured as 50 Mbps. Without traffic shaping, Transmission Control Protocol (TCP) performance can be severely degraded.
- Your equipment should properly classify traffic according to its delay-sensitivity so that it can be prioritized in the event of a burst or sustained congestion on your circuit.
- If your Comcast Business Ethernet service of Ethernet Private Line (EPL) and Ethernet Network Service (ENS) includes multi-priority circuits from a single UNI port, each CoS traffics within that UNI is treated as a complete separate circuit (i.e., each CoS traffics are subject to its own CIR etc). In addition, the traffics must be...
tagged at layer 2 to receive proper treatment in the Comcast network, with VLAN ID in the range of 1-4094, and VLAN 802.1p according to the following table:

<table>
<thead>
<tr>
<th>CoS</th>
<th>802.1p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premium</td>
<td>5</td>
</tr>
<tr>
<td>Priority</td>
<td>2-3</td>
</tr>
<tr>
<td>Basic</td>
<td>0-1</td>
</tr>
</tbody>
</table>

Untagged traffics may be treated as Basic CoS if basic CoS circuit is subscribed.

For Multiple CoS EVPL (very rare), C-VLAN ID must be tagged correctly as part of service agreement, in addition to the CoS 802.1p requirements above.

**Transmission Control Protocol (TCP) Optimization**

To ensure TCP is set at optimal parameters allowing Internet-driven applications to work as expected, TCP window size must account for Bandwidth Delay of Product (BDP). A typical formula is as follows:

\[
\text{BDP (bits)} = \text{total\_available\_bandwidth (bits/sec)} \times \text{round\_trip\_time (sec)}
\]

1. The Bandwidth Delay of Product (BDP) determines the amount of data that can be in transit in the network. BDP is the product of the available bandwidth and the latency (round-trip time).
2. This is your total available bandwidth.
3. The Round-Trip Time (RTT) value is the measured delay from the transmitting host to the receiving host of the TCP connection and back. Different BDP results are expected for communications to different locations.

**Additional Considerations**

- Ethernet Virtual Private Line (EVPL) customers must have VLAN tagging enabled on their equipment to comply with the IEEE 802.1Q tagging standard.
- Ethernet Network Service (ENS) has a maximum of 2500 MAC addresses/unique network connected devices across all sites in an ENS domain.
- Customers who use their own IP allocations or advertise Comcast-allocated space via Border Gateway Protocol (BGP) for their Comcast Ethernet Dedicated Internet Service will experience a delay of up to 72 hours for correct routing and propagation to occur from the time the allocation is added to the Internet Routing Registry.

**FREQUENTLY ASKED QUESTIONS**

**I have connected my equipment to the Comcast port for the first time and it’s not working. Who do I call for assistance?**

If you connected your equipment and have not scheduled the port to be activated, please contact the Comcast Test and Turn-Up Team at 877-666-8124 Monday through Friday from 8 AM to 1 AM, EST. All customer connections to Comcast service must be scheduled in advance to avoid operational issues.
Who do I contact if I have an issue or question regarding my Ethernet service AFTER initial acceptance of service?
Please contact Enterprise Technical Support at 800-741-4141.

Who do I contact if I have a question regarding my Ethernet bill?
Please email enterprise_billing@cable.comcast.com for billing support questions.

What information do I need to report a service issue to the Enterprise Technical Support team?
To identify your account, please provide your company name, customer account number, or a circuit ID. Please be prepared to provide the location of the problem (if it is site specific), the service that is affected, a description of the problem and the IP address of the affected equipment (if applicable).

Do I need to inform Comcast if I make changes to my systems that are connected to a Comcast Ethernet service?
Maintaining customer networks and systems is the responsibility of the customer. We do not expect there to be impacts, however, if a problem develops after you have made a change, please contact us and provide information about the change to the Technical Support representative when reporting the problem.

Do I need any special Ethernet cables or adapters to plug into my equipment?
In the majority of applications, the cable should be a straight Ethernet cable. No special cables are needed.

Where can I find network information (IP blocks, gateways, subnets, DNS, etc.) for my Ethernet Dedicated Internet service?
Typically, you will receive two separate IP blocks. The IP blocks for the Ethernet Dedicated Internet service (EDI) are split into two separate blocks, a point to point block and a customer allocation block. The point to point block is used to connect the WAN interface on your Layer 3 device to the Comcast switch, and the customer allocation block is for your LAN interface.

The point to point (P2P) block connects the outgoing interface of your equipment to the Comcast network. For example if you are given a P2P block of 50.100.100.100/30, your interface IP will be set to 50.100.100.100 + 2 = 50.100.100.102, and the gateway IP will be set to 50.100.100.100 + 1 = 50.100.100.101. The subnet mask for a /30 P2P block is 255.255.255.252.

The customer allocation block contains the IPs that you ordered and will vary in size depending on what was requested. Comcast routes your customer usable range over the P2P connection. For example, if you are given a /28 customer allocation block there are 14 usable hosts. You will need either a default or static route pointing to the P2P gateway IP (P2P block + 1) if you are not running BGP with Comcast.

Your project manager will send you your assigned IP information. You can also call Technical Support to obtain your assigned IP information.
Are there any configuration guidelines for my network device that is connecting to the Comcast service?
Comcast settings are based on specific services and needs. Below are sample guidelines for network settings.

Comcast Business Services Standard UNI Physical Settings

<table>
<thead>
<tr>
<th>Physical Interface Type (UNI)</th>
<th>Negotiation Setting</th>
<th>Speed Configuration Setting</th>
<th>Duplex Configuration Setting</th>
<th>Interface Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>100Base-T Copper</td>
<td>No-Negotiation</td>
<td>100Mbps</td>
<td>Full Duplex</td>
<td>RJ45</td>
</tr>
<tr>
<td>10/100/1000Base-T (Tri-Rate Copper)</td>
<td>Auto-Negotiation</td>
<td>Auto-Negotiation</td>
<td>Auto-Negotiation (Full Duplex)</td>
<td>RJ45</td>
</tr>
<tr>
<td>1000Base-X (Gigabit Ethernet Fiber Transceiver)</td>
<td>No-Negotiation</td>
<td>1000Mbps</td>
<td>Full Duplex</td>
<td>LC-UPC</td>
</tr>
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<tr>
<th>Ethernet/Internet Service Types</th>
<th>Access Type</th>
<th>Layer 2 Framing Size (MTU)</th>
</tr>
</thead>
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<tr>
<td>Internet - Ethernet Dedicated Internet (EDI)</td>
<td>Fiber Optic</td>
<td>1522</td>
</tr>
<tr>
<td>Internet - Ethernet Dedicated Internet (EDI)</td>
<td>Coaxial</td>
<td>1522</td>
</tr>
<tr>
<td>Ethernet Transport - Ethernet Private Line (EPL); Ethernet Virtual Private Line (EVPL); Ethernet Network Service (ENS)</td>
<td>Fiber Optic</td>
<td>1600**</td>
</tr>
<tr>
<td>Ethernet Transport - Ethernet Private Line (EPL); Ethernet Virtual Private Line (EVPL); Ethernet Network Service (ENS)</td>
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<tr>
<th>Ethernet/Internet Service Types</th>
<th>Customer Port Settings</th>
<th>Ethernet Frame Formatting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet - Ethernet Dedicated Internet (EDI)</td>
<td>Access Port</td>
<td>Un-Tagged Standard Frame</td>
</tr>
<tr>
<td>Ethernet Transport - Ethernet Private Line (EPL); Ethernet Virtual Private Line (EVPL); Ethernet Network Service (ENS)</td>
<td>Trunking Port</td>
<td>IEEE 802.1Q Tagged Frame</td>
</tr>
</tbody>
</table>

These are Comcast Standard settings. For additional details, or if you are concerned about equipment compatibility issues, please contact Comcast Enterprise Technical Support at **800-741-4141** or your local Comcast Sales Engineer.

**Alternate Jumbo MTU Frame sizes may be available on certain products and services. Please contact your local Sales Team for additional information. Settings and configuration are subject to change without notice.**
**TAKE FULL ADVANTAGE OF COMCAST BUSINESS ETHERNET SERVICES**

Thank you for selecting Comcast Business for your communication needs. As those needs grow, please consider any of the other highly-reliable, scalable and secure Ethernet services described below. Since you’re already a valued Business Ethernet customer, your next service can be activated quickly and economically. Please contact your Account Executive to discuss how your organization can take full advantage of Comcast Business Ethernet services or visit [business.comcast.com/enterprise/services](http://business.comcast.com/enterprise/services).

**Ethernet Private Line Service (Point to Point)**

Meet the demand of bandwidth-intensive applications and enable the use of any VLAN or Ethernet control protocol across the service with scalable, secure point-to-point configurations delivering high-capacity fiber connections between two sites.

**Ethernet Virtual Private Line Service (Point to Multipoint)**

Ethernet Virtual Private Line provides a point-to-point connection that replaces frame relay or ATM services and supports a Service Multiplexed UNI, allowing for a single physical connection to customer premise equipment for multiple virtual connections.
**Ethernet Network Service (Multipoint to Multipoint)**

Perfect for organizations with multiple locations and high data traffic. Comcast’s Ethernet Network service allows you to connect all remote locations to each other across a Metropolitan Area Network.

*NOTE:* Ethernet Network Services with coax access will be available for select markets in 2014.

**Ethernet Dedicated Internet Service**

For enterprises that need the most bandwidth and the fastest connection providing a continuous link between their existing LAN and the public Internet, there is no better way to connect.

To learn more about these services and to view technical descriptions and details, please visit [business.comcast.com/enterprise/services](http://business.comcast.com/enterprise/services) or speak with your account representative for a custom consultation.

Restrictions apply. Not available in all areas.
ADDITIONAL

BUSINESS SERVICES

In addition to Business Ethernet, you may also have one of our other business services. This section will provide a general overview of other Comcast Business services. To learn more, please visit business.comcast.com.

BUSINESS VOICE

With your Comcast Business Voice service, you will enjoy the convenience of staying connected with high quality and robust voice service. Additionally, many Business Ethernet customers have Business Voice lines to connect with alarm, elevator, fax or other devices. For more information, please visit our online help and support library at business.comcast.com/help.

BUSINESS TV

With Business TV, you will stay connected like never before. Access to the latest news, finance, sports and pop culture trends is an important part of staying competitive in today’s marketplace:

- **You** — Having up-to-the-minute information about the events that shape your life and work will help you respond quickly to your community and your markets.
- **Employees** — Comcast Business TV in lunch rooms, break rooms and other common areas is a valuable news and information resource for your employees.
- **Customers** — They’ll want to return when long waits seem short and services are more enjoyable with the entertainment you can now provide in waiting rooms, lobbies and service areas.

**NOTE:** Not all services available in all areas. Premium channels require a premium channel subscription.

Accessing Your Channel Lineup

Log on to your account at business.comcast.com/myaccount and select My Services at the top of the page. Select TV. Sort the list numerically or alphabetically. Scroll left or right using the arrows at the bottom of the page to view more channels. In addition, depending on your area and whether you have a set-top box, you can view your lineup on your TV by one of the following methods:

- Use the channel up and down buttons on the remote control for your television.
- Use the on-screen guide, which is accessed through the remote control provided by Comcast.

Once you’ve had a chance to see the value TV brings to your business, you may want to consider upgrading your package or adding Music Choice, Sports Pack or other special programming tailored to your business’ needs.
BUSINESS VOICEEDGE™

Whether you are a business of 5 or 500, single location or multiple, Business VoiceEdge™ from Comcast lets you focus on your future instead of your infrastructure. It replaces large upfront capital outlays with predictable monthly charges, and offers advantages of particular relevance in a business environment where mobility and availability are crucial. Employees can be reached via a single phone number no matter where they are — or what device they are using. Advanced features such as voicemail-to-email and mobile applications are possible. New offices and users can quickly be added to the system and companies can control features and services from an integrated online website. To learn more, please visit business.comcast.com/voiceedge.

BUSINESS TRUNKS

If you need a more efficient, intelligent phone service to meet the growing needs of your business, Business Trunks is the solution. Our PRI Trunks connect to your existing PBX equipment and allow you to maximize your phone capabilities over Comcast’s advanced IP network. To learn more, please visit business.comcast.com/trunks.

COMCAST BUSINESS PROMISE

You depend on Comcast Business for the success of your business and we take that trust seriously. Comcast Business is committed to delivering on the promise of providing customers the most reliable data, voice, and TV services that consistently exceed expectations. If your service is interrupted, we promise to resolve it as quickly as possible. If you report a service interruption that was our issue, you will receive a bill credit. It’s that simple. That’s Comcast — we back our service with this promise because business can’t wait.

We make the following commitments to our Business Ethernet customers:

- Dedicated project managers from design to install
- Service Level Agreement for end-to-end coverage of Comcast-provided equipment, the local access network and the backbone network
- Ethernet proactive monitoring to the customer premise
- 24x7 Dedicated Business Support

To learn more about our Comcast Business Promise, please visit business.comcast.com/promise.