COMCAST ENTERPRISE SERVICES
MASTER SERVICES AGREEMENT (MSA)

MSA ID#: IL-407573-lkasi	MSA Term: 60 months	Customer Name: Village of Orland Park

CUSTOMER INFORMATION

Primary Contact: Frank Florentine	Primary Contact Address Information
Title: CTO	Address 1: 14700 Ravinia Ave
Phone: 708-403-6100	Address 2:
Cell:	City: Orland Park
Fax:	State: IL
Email: fflorentine@orlandpark.org	Zip Code: 60462

This Master Service Agreement ("Agreement") sets forth the terms and conditions under which Comcast Cable Communications Management, LLC and its operating affiliates ("Comcast") will provide communications and other services ("Services") to the above Customer. The Agreement consists of this fully executed Master Service Agreement Cover Page ("Cover Page"), the Enterprise Services General Terms and Conditions ("General Terms and Conditions"), any written amendments to the Agreement executed by both parties ("Amendments"), the Product-Specific Attachment for the applicable Services ("PSA(s)") and each Sales Order accepted hereunder ("Sales Orders"). In the event of any inconsistency among these documents, precedence will be as follows: (1) this Cover Page (2) General Terms and Conditions, (3) PSA(s), , and (4) Sales Orders. This Agreement shall be legally binding when signed by both parties and shall continue in effect until the expiration date of any Service Term specified in a Sales Order referencing the Agreement, unless terminated earlier in accordance with the Agreement.

The Customer referenced above may submit Sales Orders to Comcast during the Term of this Agreement ("MSA Term"). After the expiration of the initial MSA Term, Comcast may continue to accept Sales Orders from Customer under the Agreement, or require the parties to execute a new MSA.

The Agreement shall terminate in accordance with the General Terms and Conditions. The General Terms and Conditions and PSAs are located at http://business.comcast.com/enterprise-terms-of-service/index.aspx(or any successor URL).Use of the Services is also subject to the High-Speed Internet for Business Acceptable Use Policy ("AUP") located at http://business.comcast.com/customer-notifications/acceptable-use-policy (or any successor URL), and the High-Speed Internet for Business Privacy Policy (Privacy Policy") located at http://business.comcast.com/customer-notifications/customer-privacy-statement (or any successor URL). Comcast may update the General Terms and Conditions, PSAs, AUP and Privacy Policy from time to time upon posting to the Comcast website.

Services are only available to commercial customers in wired and serviceable areas in participating Comcast systems (and may not be transferred). Minimum Service Terms are required for most Services and early termination fees may apply. Service Terms are identified in each Sales Orders, and early termination fees are identified in the applicable Product Specific Attachments.

BY SIGNING BELOW, CUSTOMER AGREES TO THE TERMS AND CONDITIONS OF THIS AGREEMENT.

CUSTOMER SIGNATURE (by authorized representative)

Signature:
Name:
Title:
Date:

COMCAST USE ONLY (by authorized representative)

Signature:	Sales Rep: Lynn Kasik
Name:	Sales Rep Email: lynn_kasik@cable.comcast.com
Title:	Region: Chicago
Date:	Division: Central

COMCAST BUSINESS

COMCAST ENTERPRISE SERVICES SALES ORDER FORM

Account Name: Village of Orland Park **MSA ID#:** IL-407573-lkasi **SO ID#:** IL-407573-lkasi-6991408

CUSTOMER INFORMATION (for notices)

Primary Contact: Norm Johnson
Title: IT Manager
Address 1: 11351 W 159TH ST ORLAND PARK
Address 2:
City: Orland Park
State: IL
Zip: 60467
Allowable Contract Date:
Phone: (708) 403-6100
Cell:
Fax:
Email: njohnson@orlandpark.org
Contract Generated Date: 08/26/2016

SUMMARY OF CHARGES (Details on following pages)

Service Term (Months): 60

SUMMARY OF SERVICE CHARGES*

Total Ethernet Monthly Recurring Charges:	$ 2,000.00
Total Trunk Services Monthly Recurring Charges:	$ 0.00
Total Off-Net Monthly Recurring Charges:	$ 0.00
Total Monthly Recurring Charges (all Services):	**$ 2,000.00**

SUMMARY OF STANDARD INSTALLATION FEES

Total Ethernet Standard Installation Fees*:	$ 0.00
Total Trunk Services Standard Installation Fees:	$ 0.00
Total Off-Net Standard Installation Fees:	$ 0.00
Total Standard Installation Fees (all Services):	**$ 0.00**

SUMMARY OF CUSTOM INSTALLATION FEES

Total Custom Installation Fee:	**$ 0.00**
Amortized Custom Installation Fee	$ 0.00

SUMMARY OF EQUIPMENT FEES

Total Monthly Recurring Ethernet Equipment Fees:	$ 0.00
Total Monthly Recurring Trunk Services Equipment Fees:	$ 0.00
Total Monthly Recurring Equipment Fees (all Services):	**$ 0.00**

*Note: Charges identified in the Service Order are exclusive of maintenance and repair charges, and applicable federal, state, and local taxes, USF fees, surcharges and recoupments (however designated). Please refer to your Comcast Enterprise Services Master Services Agreement (MSA) for specific detail regarding such charges. Customer shall pay Comcast one hundred percent (100%) of the non-amortized Custom Installation Fee prior to the installation of Service.

GENERAL COMMENTS

AGREEMENT

This Comcast Enterprise Services Sales Order Form ("Sales Order") shall be effective upon acceptance by Comcast. This Sales Order is made a part of the Comcast Enterprise Services Master Services Agreement, entered between Comcast and the undersigned and is subject to the Product Specific Attachment for the Service(s) ordered herein, located at http://business.comcast.com/enterprise-terms-of-service/index.aspx, (the "Agreement") . Unless otherwise indicated herein, capitalized words shall have the same meaning as in the Agreement.

E911 NOTICE

Comcast Business Class Trunking Service may have the E911 limitations specified below:

• The National Emergency Number Association (NENA), a 911 industry organization that makes recommendations for standardized services relating to E911, has issued guidelines that state "The PBX owner is responsible for creating customer records, preferably in NENA standard format, that identify caller locations." To facilitate Customer's compliance with these guidelines and with associated state and local requirements related to provision of Automatic Location Information (ALI) for E911 services, Comcast offers two options:

a. Comcast will send to the ALI database or Subscriber Location Database (SLDB) the main billing telephone number and the main address provided by Customer; or

b. Customer may choose to sign up for up to 10 Emergency Location Information Numbers (ELINs) that Customer could assign to zones within Customer's premises that would be separately identified to the E911 call taker. The location information, such as a specific floor, side of a building, or other identifying information, could assist emergency responders to more quickly reach the appropriate location. Customer is solely responsible for programming it's PBX system to map each station to one of these numbers, and for updating the system as necessary to reflect moves or additions of stations within the premises. Comcast will send the assigned ELINs to the ALI or SLDB database, as is appropriate.

• Many jurisdictions require businesses using multi-line telephone systems to program their systems to transmit specific location information for 911 calls. Customer bears sole responsibility to ensure that it identifies and complies with all such requirements. In any event, if Customer does not maintain E911 records in a timely and accurate manner, the E911 call taker may not receive proper location information, and emergency responders may be delayed or even prevented from timely reaching the caller's location.

• Battery Back Up - The Integrated Access Device (IAD) provided by Comcast is not equipped with battery backup. It is Customer's responsibility to ensure adequate back-up power is provided to ensure service continuity during a power outage, as employees would otherwise be unable to use the Services, including dialing 9-1-1, when power is unavailable.

• Calls using the Service, including calls to 911, may not be completed if there is a problem with network facilities, including network congestion, network/equipment/power failure, or another technical problem.

• All questions should be directed to 1-800-391-3000. E911 Service, Private Branch Exchange, and Direct Inward Dial Service.

By signing below, Customer acknowledges, agrees to and accepts the terms and conditions of this Sales Order.

CUSTOMER USE ONLY (by authorized representative)	COMCAST USE ONLY (by authorized representative)		
Signature:	Signature:	Sales Rep:	Lynn Kasik
Name:	Name:	Sales Rep E-Mail:	lynn_kasik@cable.comcast.com
Title:	Title:	Region:	Chicago
Date:	Date:	Division:	Central

COMCAST BUSINESS

COMCAST ENTERPRISE SERVICES SALES ORDER FORM

ETHERNET SERVICES AND PRICING

Account Name: Village of Orland Park

Date: August 26, 2016

MSA ID#: IL-407573-lkasi

SO ID#: IL-407573-lkasi-6991408

Short Description of Service:

Service Term (Months): 60

Solution Charges

Line	Request	Action	Service(s)	Description	Service Location A*	Service Location Z*	Comcast Metro	Performance Tier**	Tax Jurisdiction	Monthly	One-Time
1	New	Add	ENIGIGE	Port	Village of Orland Park - Sportsplex - 11351 W 159th St 11351 W 159TH ST		Greater Chicago			$ 271.65	$ 0.00
2	New	Add	EQP FEE	Equipment Fee	Village of Orland Park - Sportsplex - 11351 W 159th St 11351 W 159TH ST					$ 0.00	$ 0.00
3	New	Add	EDI-ENI-10100	Port	Village of Orland Park - Village Hall - 14700 Ravinia Ave 14700 S RAVINIA AVE					$ 0.00	$ 0.00
4	New	Add	ENIGIGE	Port	Village of Orland Park - Village Hall - 14700 Ravinia Ave 14700 S RAVINIA AVE		Greater Chicago			$ 271.65	$ 0.00
5	New	Add	EQP FEE	Equipment Fee	Village of Orland Park - Village Hall - 14700 Ravinia Ave 14700 S RAVINIA AVE					$ 0.00	$ 0.00
6	New	Add	EDI-100	100 Mbps	Village of Orland Park - Village Hall - 14700 Ravinia Ave 14700 S RAVINIA AVE				Interstate	$ 1,042.95	$ 0.00
7	New	Add	EPL-BASIC-100	100 Mbps	Village of Orland Park - Village Hall - 14700 Ravinia Ave 14700 S RAVINIA AVE	Village of Orland Park - Sportsplex - 11351 W 159th St 11351 W 159TH ST		PT1	Interstate	$ 413.75	$ 0.00
* Services Location Details attached **Performance Tier Matrix Attached (For On-Net to On-Net or On-Net to Off-Net)						**Total**				Service Charges: $ 2,000.00 Equipment Fees: $ 0.00	$ 0.00

COMCAST BUSINESS

COMCAST ENTERPRISE SERVICES SALES ORDER FORM

SERVICE LOCATION DETAIL INFORMATION

Account Name: Village of Orland Park **MSA ID#:** IL-407573-lkasi **SO ID#:** IL-407573-lkasi-6991408 **Date:** August 26, 2016

Line	Location Name / Site ID	Address 1	Address 2	City	State	Zip Code	DeMarc Location	Extend to DeMarc (Yes/No)	Inside Wiring (Yes/No)	Technical / Local Contact Name	Technical / Local Contact Phone #	Technical / Local Contact Email Address	Technical Contact On Site (Yes/No)	Satellite Location (Y/N)
1	Village of Orland Park - Village Hall - 14700 Ravinia Ave	14700 S RAVINIA AVE	FLOOR 1	ORLAND PARK	IL	60462				Norm Johnson	(708) 403-6100	njohnson@orlandpark.org	Yes	No
2	Village of Orland Park - Sportsplex - 11351 W 159th St	11351 W 159TH ST	FL 1	ORLAND PARK	IL	60467				Norm Johnson	(708) 403-6100	njohnson@orlandpark.org	Yes	No

Comcast Enterprise Services Sales Order Form
Ethernet Transport Services
Performance Tier (PT) Matrix

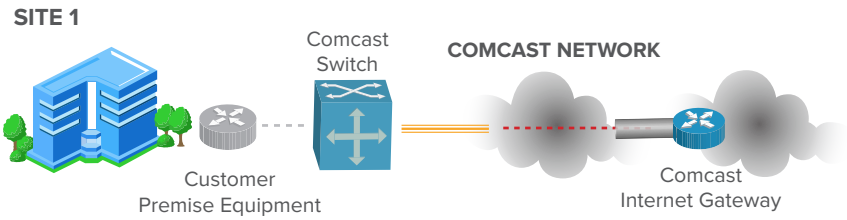
Metro	PA	CAR	CNM	CGA	CO	ETN	FPA	ATL	BOS	CHI	PHL	HOU	IND	JAC	MI	MAT	MTN	MN	NAL	NCA	OR	SFL	SCA	STN	SWF	SWT	UT	WA	WNE
Central & Western PA (PA)	PT1	PT3	PT4	PT3	PT3	PT3	PT3	PT2	PT2	PT2	PT2	PT3	PT2	PT3	PT2	PT2	PT2	PT3	PT3	PT4	PT4	PT3	PT4	PT2	PT3	PT3	PT3	PT4	PT2
Central Arkasas (CAR)	PT3	PT1	PT3	PT2	PT2	PT3	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT3	PT2	PT3	PT3	PT3
Central New Mexico (CNM)	PT4	PT3	PT1	PT3	PT2	PT4	PT3	PT4	PT4	PT3	PT4	PT3	PT3	PT4	PT3	PT4	PT4	PT3	PT3	PT3	PT4	PT4	PT3	PT3	PT3	PT3	PT3	PT4	PT4
Coastal Georgia (CGA)	PT3	PT2	PT3	PT1	PT3	PT3	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT4	PT4	PT2	PT4	PT2	PT2	PT2	PT3	PT4	PT3
Colorado (CO)	PT3	PT2	PT2	PT3	PT1	PT4	PT3	PT3	PT3	PT2	PT3	PT2	PT2	PT3	PT2	PT3	PT3	PT2	PT3	PT2	PT3	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3
Eastern Tennessee (ETN)	PT3	PT3	PT4	PT3	PT4	PT1	PT3	PT2	PT4	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT2	PT4	PT4	PT3	PT4	PT2	PT3	PT3	PT4	PT4	PT4
Florida Panhandle (FPA)	PT3	PT3	PT3	PT2	PT3	PT3	PT1	PT2	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT3	PT2	PT3	PT4	PT2	PT4	PT2	PT2	PT3	PT3	PT4	PT3
Greater Atlanta (ATL)	PT2	PT2	PT4	PT2	PT3	PT2	PT2	PT 1	PT3	PT2	PT2	PT 2	PT2	PT2	PT2	PT2	PT2	PT3	PT2	PT3	PT3	PT2	PT3	PT2	PT2	PT2	PT3	PT3	PT3
Greater Boston (BOS)	PT2	PT3	PT4	PT3	PT3	PT4	PT3	PT3	PT1	PT2	PT2	PT3	PT2	PT3	PT2	PT2	PT3	PT3	PT3	PT4	PT4	PT3	PT4	PT3	PT3	PT3	PT4	PT4	PT2
Greater Chicago (CHI)	PT2	PT3	PT3	PT3	PT2	PT3	PT2	PT2	PT2	PT1	PT2	PT2	PT2	PT2	PT2	PT2	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2
Greater Phil. & New Jersey (PHL)	PT2	PT3	PT4	PT3	PT3	PT3	PT3	PT2	PT2	PT2	PT1	PT3	PT2	PT3	PT2	PT2	PT2	PT3	PT3	PT4	PT4	PT3	PT4	PT3	PT3	PT3	PT3	PT4	PT2
Houston (HOU)	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT3	PT2	PT3	PT1	PT2	PT2	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT3
Indiana (IND)	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT2	PT2	PT2	PT2	PT1	PT2	PT2	PT2	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT2
Jacksonville (JAC)	PT3	PT3	PT4	PT2	PT3	PT3	PT2	PT2	PT3	PT2	PT3	PT2	PT2	PT1	PT3	PT3	PT2	PT3	PT2	PT4	PT4	PT2	PT4	PT3	PT2	PT3	PT3	PT4	PT3
Michigan (MI)	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT2	PT2	PT2	PT3	PT2	PT3	PT1	PT2	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT2
Mid-Atlantic (MAT)	PT2	PT3	PT4	PT3	PT3	PT3	PT3	PT2	PT2	PT2	PT2	PT3	PT2	PT3	PT2	PT1	PT2	PT3	PT3	PT4	PT4	PT3	PT4	PT3	PT3	PT3	PT3	PT4	PT2
Middle Tennessee (MTN)	PT2	PT2	PT4	PT3	PT3	PT2	PT2	PT2	PT3	PT2	PT2	PT2	PT2	PT2	PT2	PT2	PT1	PT2	PT2	PT3	PT3	PT2	PT3	PT2	PT3	PT3	PT3	PT3	PT3
Minnesota (MN)	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT3	PT2	PT3	PT2	PT1	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3
Northern AL (NAL)	PT3	PT2	PT3	PT2	PT3	PT2	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT3	PT1	PT4	PT4	PT3	PT4	PT2	PT2	PT2	PT3	PT4	PT3
Northern CA (NCA)	PT4	PT3	PT3	PT4	PT2	PT4	PT3	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT1	PT2	PT4	PT2	PT4	PT4	PT3	PT2	PT2	PT4
Oregon & SW Washington (OR)	PT4	PT3	PT4	PT4	PT3	PT4	PT4	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT2	PT1	PT4	PT2	PT4	PT4	PT3	PT2	PT2	PT4
South Florida (SFL)	PT3	PT3	PT4	PT2	PT3	PT3	PT2	PT2	PT3	PT3	PT3	PT2	PT3	PT2	PT3	PT3	PT2	PT3	PT3	PT4	PT4	PT1	PT4	PT3	PT2	PT3	PT3	PT4	PT3
Southern California (SCA)	PT4	PT3	PT3	PT4	PT2	PT4	PT4	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT2	PT2	PT4	PT1	PT4	PT4	PT3	PT2	PT2	PT4
Southern TN & North GA (STN)	PT2	PT2	PT3	PT2	PT3	PT2	PT2	PT2	PT3	PT2	PT3	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT2	PT4	PT4	PT3	PT4	PT1	PT3	PT2	PT3	PT4	PT3
Southwest Florida (SWF)	PT3	PT3	PT3	PT2	PT3	PT3	PT2	PT2	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT4	PT4	PT2	PT4	PT3	PT1	PT3	PT3	PT4	PT3
SW TN & Northern MS (SWT)	PT3	PT2	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT3	PT3	PT2	PT3	PT3	PT3	PT3	PT2	PT3	PT1	PT3	PT3	PT3
Utah (UT)	PT3	PT3	PT3	PT3	PT2	PT4	PT3	PT3	PT4	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT3	PT2	PT2	PT3	PT2	PT3	PT3	PT3	PT1	PT2	PT4
Washington (WA)	PT4	PT3	PT4	PT4	PT3	PT4	PT4	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT3	PT4	PT3	PT3	PT4	PT2	PT2	PT4	PT2	PT4	PT4	PT3	PT2	PT1	PT4
Western New England (WNE)	PT2	PT3	PT4	PT3	PT3	PT4	PT3	PT3	PT2	PT2	PT2	PT3	PT2	PT3	PT2	PT2	PT3	PT3	PT3	PT4	PT4	PT3	PT4	PT3	PT3	PT3	PT4	PT4	PT1

COMCAST BUSINESS

ETHERNET DEDICATED INTERNET SERVICE

Comcast Business Ethernet Dedicated Internet (EDI) Service is a simple, reliable and more flexible option to traditional private line dedicated Internet access services, providing higher bandwidth and increased efficiencies.

Ethernet Dedicated Internet provides an Ethernet Virtual Connection (EVC) from the customer premises location to a Comcast Internet Point of Presence (POP) router. Our Ethernet interface enables compatibility with your LAN.



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 than with Comcast Business Ethernet Dedicated Internet.

Ethernet Dedicated Internet is offered in 10Mbps/100Mbps, 1Gbps and 10Gbps Ethernet User Network Interface (UNI) in speed increments from 2Mbps to 10Gbps subject to available capacity.

SYMMETRICAL CONNECTIVITY

Symmetrical dedicated Internet bandwidth configurable from 2Mbps to 10Gbps in 1Mbps increments

IP ADDRESSES

Static IP addresses assigned based on American Registry for Internet Numbers (ARIN) guidelines and customer justification

DOMAIN NAME SYSTEM

Includes primary and secondary DNS service. Comcast will assist customers in transferring existing domain names

BORDER GATEWAY PROTOCOL ROUTING

Optional BGP setup to facilitate multi-homing between multiple ISP networks

WEB-BASED REPORTING

Connectivity statistics for the previous day, seven-day or thirty-day period can be viewed through a secure web portal

BUSINESS SUPPORT

24/7/365 network monitoring and support through our Business Network Operations Center (BNOC)

CE 2.0 MEF CERTIFIED

Ethernet Excellence Awards 2014 — Best Service of the Year North America

Vertical Systems Group Year-End 2014 U.S. Carrier Ethernet Services Leaderboard

For more information or a free consultation, contact your local Enterprise Account Executive.

business.comcast.com

COMCAST BUSINESS PROMISE

COMCAST BUSINESS B4B

ETHERNET DEDICATED INTERNET SERVICE TECHNICAL DESCRIPTION

Service Description

Comcast's Ethernet Dedicated Internet (EDI) Service provides a reliable, simpler, more flexible, and higher bandwidth options than T1 or SONET-based dedicated Internet access services. The service is offered with a 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interface (UNI) in speed increments from 1Mbps to 10Gbps subject to available capacity. The service provides an Ethernet Virtual Connection (EVC) from the customer premises location to a Comcast Internet Point of Presence (POP) router.

Section 1. Technical Specifications

1.1 Ethernet User-to-Network Interface. The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS).

UNI Speed	UNI Physical Interface
10Mbps	10BaseT
100Mbps	100BaseT
1Gbps	1000BaseT or 1000BaseSX
10Gbps	10GBASE-SR or 10GBASE-LR

CIR Increments	CBS (bytes)
1Mbps	25,000
10Mbps	250,000
100Mbps	2,500,000
1000Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR Increments

1.2 Traffic Management. Comcast's network traffic-policing policies restrict traffic flows to the subscribed, Committed Information Rate (CIR). If the customer-transmitted bandwidth rate exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. The customer's router must shape their traffic to their contracted CIR.

1.3 Maximum Frame Size. The service supports a maximum transmission unit (MTU) frame size of 1518 bytes including Layer 2 Ethernet header and FCS.

1.4 Layer 2 Control Protocol (L2CP) Processing. All L2CP frames are discarded at the UNI.

1.5 IP Address Allocation. IP address space is an essential requirement for all Internet access services. Comcast assigns eight (8) routable IPv4 addresses to each customer circuit. Customers can obtain additional IPv4 addresses if required. Customers may also request a /48 of IPv6 addresses if they would like to enable a native dual stack solution.

1.6 Domain Name Service. Comcast provides primary and secondary Domain Name Service (DNS). DNS is the basic network service that translates host and domain names into corresponding IP addresses, and vice-versa.

1.7 Border Gateway Protocol (BGP) Routing. Comcast supports BGP-4 routing as an optional service feature. BGP-4 allows customers to efficiently multi-home across multiple ISP networks. The service requires an Autonomous System Number (ASN) be assigned to a customer by the American Registry for Internet Numbers (ARIN). Customers should also be proficient in BGP routing protocol to provision and maintain the service on their router. Section 5 "Comcast BGP Policy" provides further details. Comcast supports private peering if the customer is multi-homed to Comcast's network only.

Section 2. Monitoring, Technical Support and Maintenance

2.1 Network Monitoring. Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

2.2 Technical Support. Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating Customer Premise Equipment (CPE) not provided by Comcast.

2.3 Escalation. Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the ETS as follows: Supervisor at the end of the standard interval plus one (1) hour; to the Manager at the end of the standard interval plus two (2) hours, and to the Director at the end of the standard interval plus four (4) hours.

2.4 Maintenance. Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

3.1 Availability. Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1. Figure 2 lists the availability objectives for each access Ethernet access type.

On-Net Services (≤ 250 miles)	
Availability (On-Net Services delivered via Fiber)	> 99.99%
Availability (On-Net Services delivered via HFC Network)	> 99.9%
Off-Net Services	
Availability (Off-Net)	> 99.95%

Figure 2: Availability

3.2 Mean Time to Respond. Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

3.3 Mean Time to Restore. Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the ETS.

COMCAST BUSINESS

ETHERNET DEDICATED INTERNET SERVICE TECHNICAL DESCRIPTION

Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

Customers have the following responsibilities related to the installation, support, and maintenance of the Service.

4.1 Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

4.2 Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

4.3 Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

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4.6 Obtain 'right-of-way' entry easement for Comcast facilities and equipment from property owners at each customer location.

4.7 The customer is responsible for coring of the building's outside wall and internal walls. Upon request, Comcast can perform this activity on an 'as needed' basis for an additional one-time fee.

4.8 Provide UPS AC power equipment, circuit sizing to be determined, if applicable.

4.9 Emergency local generator backup service, if applicable.

4.10 Provide access to the buildings and point of demarcation at each customer location to allow Comcast and its approved Contractors to install fiber for service installation. Provide access to each location for regular (8am - 5pm) and emergency (24 hour) service and maintenance of Comcast's equipment and facilities.

4.11 Provide, install and maintain a device that is capable of routing network traffic between the Service and the customer's Local Area Network (LAN).

4.12 Customer must provide a point of contact (POC) for installation, service activation and any maintenance activities.

Section 5. Comcast BGP Policy

The following provides the routing requirements to interconnect with the Comcast network. Additional details of Comcast's BGP inbound/outbound network policy and traffic engineering is available upon request.

5.1 Customers must be multi-homed to run BGP, either:

a. multi-homed within Comcast's network

b. multi-homed with Comcast and another service provider

5.2 Customers must use an Autonomous System (AS) number assigned by a regional registrar American Registry for Internet Numbers (ARIN), Réseaux IP Européens (RIPE), or Asia Pacific Network Information Centre (APNIC) etc. that is registered to their organization.

a. All customer route announcements must be registered with a regional registrar. A route object must exist for each route prefix in one of the well known global routing registries such as RADB.
b. The customer ASN needs to be verifiable in WHOIS database.
c. Comcast will only accept private peering when the customer is multi-homed to Comcast only.
d. Comcast will support a 4-byte ASN starting 01/01/2010 in accordance with ARIN policy.
e. Comcast will assign a private ASN in the range of 64512-65534 for private peering and not accept any customer provided private ASN.
f. Comcast will strip off the private ASN when advertising to peers.

5.3 Customers must use a router that supports BGPv4.

a. Comcast will not run BGP4 with customers connected on a link with less than 2Mbps bandwidth.
b. Customers are responsible to ensure their peering routers have adequate CPE processing power and memory space if a full Internet table is requested.
c. Comcast will employ all best-known practices to establish, maintain, and troubleshoot BGP4 sessions with all BGP4 compliant router vendors. However, Comcast makes no warranty that it can establish and maintain a BGP4 session with any CPE due to vendor interoperability.

5.4 Customers can specify one of the following received-prefixes options:

a. Default-route only
b. Comcast customer routes
c. Comcast customer routes + default-route
d. Full routes
e. Full routes + default-route

5.5 Customer must be capable of configuring their BGP session with Comcast. This includes all setup of neighbor statements and all sanity checks on customer CPE.

5.6 Comcast requests the use of an MD5 authentication key for all EBGP sessions. The customer should specify the MD5 password.

5.7 Customers must prevent redistribution from their Interior Routing Protocol (IGP) into BGP. Customers should also apply restrictive filters on outbound announcements so that only the customer's intended outbound prefixes are announced to Comcast.

5.8 Comcast will assign a /30 IP address for the interfaces that connect to Comcast's network. This will be assigned from a Comcast address block publicly registered with ARIN and already advertised as part of a larger aggregate to the Internet.

5.9 Comcast will announce any portable or non-portable net block so long as this space is larger than /24, and the space is assigned to the customer via WHOIS or RWHOIS databases. If the net block does not belong to the customer and the net block is not already being announced from the customer's AS then Comcast will need to have an LOA (Letter of Agreement) from the true owner of the block stating that they are aware of, and are accepting of the fact that our customer wants to make the announcement through Comcast.

5.10 Comcast does not alter any of its BGP4 configurations, including route-maps, filter-policies, and communities, for any individual customer, but rather will dynamically alter BGP policy dependent on the customers' employment of predefined Comcast BGP communities. This ensures the Comcast network is built and maintained in a strategic, organized, and efficient fashion and reduces mean-time-to-repair for BGP related trouble.

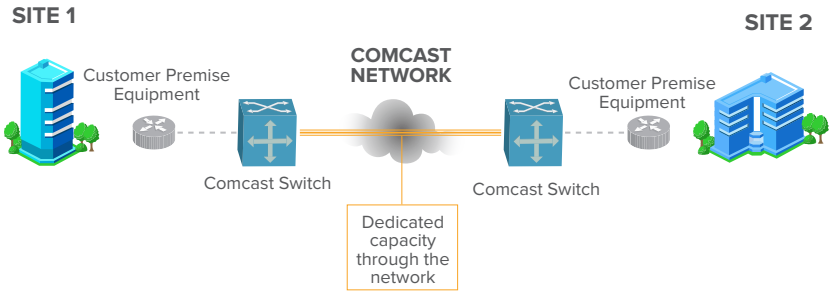
COMCAST BUSINESS

ETHERNET PRIVATE LINE SERVICE

Comcast Business Ethernet Private Line (EPL) Service (point-to-point) is a reliable, flexible, high bandwidth alternative to traditional TDM Private Lines, enabling customers to connect their Customer Premises Equipment (CPE) using a lower cost Ethernet interface.

Ethernet Private Line Service allows customers to use any VLANs or Ethernet control protocol across the service.

Your organization can meet the demand of bandwidth-intensive applications without disrupting your internal customers' needs with flexible, scalable point-to-point configurations delivering high-capacity fiber connections between two sites.



Ethernet Private Line offers three Classes of Service (CoS) including: Basic, Priority, and Premium, enabling customers to select the solution that best meets their applications' performance requirements.

Ethernet Private Line Service is offered in 10Mbps/100Mbps, 1Gbps and 10Gbps Ethernet User Network Interfaces (UNI), and is available in speed increments from 2Mbps to 10Gbps.

DEDICATED CONNECTIVITY

Dedicated capacity between locations

REDUNDANT SITE PROTECTION

Optional path and equipment redundancy can be provided for added reliability

FLEXIBLE CONFIGURATIONS

Bandwidth scalable up to 10Gbps with multiple CoS options

BUSINESS SUPPORT

24/7/365 network monitoring and support through our Business Network Operations Center (BNOC)

CE 2.0 MEF CERTIFIED

MEF ETHERNET EXCELLENCE AWARDS 2014 Best Service of the Year North America

VERTICAL SYSTEMS GROUP YEAR-END 2014 U.S. CARRIER ETHERNET SERVICES LEADERBOARD

For more information or a free consultation, contact your local Enterprise Account Executive.

business.comcast.com

COMCAST BUSINESS PROMISE

COMCAST BUSINESS B4B

ETHERNET PRIVATE LINE SERVICE TECHNICAL DESCRIPTION

Service Description

Comcast Ethernet Private Line (EPL) Service is a reliable, more flexible, higher bandwidth alternative to traditional TDM Private Lines. The service enables customers to connect their Customer Premises Equipment (CPE) using a lower cost Ethernet interface. EPL enables customers to use any VLANs or Ethernet control protocol across the service without coordination with Comcast.

EPL provides one Ethernet Virtual Connection (EVC) between two customer locations. EPL offers three Classes of Service (CoS): Basic, Priority, and Premium. CoS options enable customers to select the CoS that best meets their applications' performance requirements. The service is offered with 10Mbps, 100Mbps, 1Gbps or 10Gbps Ethernet User-to-Network Interfaces (UNI) and is available in speed increments from 1Mbps to 10Gbps.

Comcast's Ethernet Private Line Service is Certified MEF Compliant.

Section 1. Technical Specifications

1.1 Ethernet User-to-Network Interface. The service provides bidirectional, full duplex transmission of Ethernet frames using a standard IEEE 802.3 Ethernet interface. Figure 1 lists the available UNI physical interfaces, their associated Committed Information Rate (CIR) bandwidth increments and the Committed Burst Sizes (CBS). CIR increments of less than 10Mbps are not available with Off-Net Services.

UNI Speed	UNI Physical Interface
10Mbps	10BaseT
100Mbps	100BaseT
1Gbps	1000BaseT or 1000BaseSX
10Gbps	10GBASE-SR or 10GBASE-LR

CIR Increments	CBS (bytes)
1Mbps	25,000
10Mbps	250,000
100Mbps	2,500,000
1000Mbps	25,000,000

Figure 1: Available UNI interface types and CBS values for different CIR Increments

1.2 Class of Service Options. The service offers three CoS options. The CoS options allow for differentiated service performance levels for different types of network traffic. It is used to prioritize customer mission-critical traffic over lesser priority traffic in the network. The customer must specify a CIR for each CoS to indicate how much bandwidth should be assigned to it. Figure 2 lists the service performance objectives associated with On-Net (for distances within 250 network miles) and Off-Net Services. Only Basic CoS is permissible for Off-Net Services and On-Net Services delivered via the Comcast Hybrid Fiber Coax (HFC) Network.

	Class of Service (CoS)		
Performance Objective	Premium	Priority	Basic
On-Net Services (≤ 250 miles)			
Latency (one way)	< 12ms	< 23ms	< 45ms
Jitter (one way)	< 2ms	< 23ms	< 45ms
Packet Loss (one way)	< 0.001%	< 0.01%	< 1%
Availability (On-Net Services delivered via Fiber)	> 99.99%	> 99.99%	> 99.99%
Availability (On-Net Services delivered via HFC Network)	Not Applicable	Not Applicable	> 99.9%
Off-Net Services			
Availability	Not Applicable	Not Applicable	> 99.95%

Figure 2: CoS Performance Objectives

1.3 CoS Identification and Marking. Customers must mark all packets using 802.1p CoS values as specified in Figure 3 to ensure the service will provide the intended CoS performance objectives specified in Figure 2. Locations delivered via Off-Net Services or On-Net Services delivered via the HFC Network will not honor any CoS value other than Basic. All other values will be treated as Basic.

CoS	802.1p
Premium	5
Priority	2-3
Basic	0-1

Figure 3: CoS Marking

1.4 Traffic Management. Comcast's network traffic-policing policies restrict traffic flows to the subscribed CIR for each service class. If the customer-transmitted bandwidth rate for any CoS exceeds the subscription rate (CIR) and burst size (CBS), Comcast will discard the non-conformant packets. For packets marked with a non-conformant CoS marking, the service will transmit them using the Basic service class without altering the customer's CoS markings.

1.5 Maximum Frame Size. The service supports a Maximum Transmission Unit (MTU) packet size of 1600 bytes to support untagged or 802.1Q tagged packet sizes. Jumbo Frame sizes can be supported on an Individual Case Basis (ICB). For On-Net Services delivered via the Comcast HFC Network, frame sizes may not exceed 1518 MTU size (1522 with a single VLAN tag). All frames that exceed specifications shall be dropped.

1.6 VLAN Tag Preservation. The service supports IEEE 802.1Q VLAN-tagged customer packets. All customer VLAN IDs and priority code points (IEEE 802.1p) for CoS are transmitted and received unaltered by the service. Untagged packets are mapped to the native VLAN specified by customer. Customers may configure their own VLANs on their customer owned CPE without coordination with Comcast. Comcast may reserve one VLAN for network management purposes.

1.7 Ethernet Service Frame Disposition. The service delivers all service frames associated with the EVC unconditionally across the network as specified in Figure 4.

Service Frame Type	Service Frame Delivery
Unicast	All frames delivered unconditionally
Multicast	All frames delivered unconditionally
Broadcast	All frames delivered unconditionally

Figure 4: Service Frame Delivery Disposition

1.8 Layer 2 Control Protocol (L2CP) Processing. Certain L2CP frames are discarded at the UNI, tunneled across the Comcast network or peered at (processed by) the UNI. Refer to Figure 5 for Comcast's L2CP disposition. For L2CPs with multiple disposition possibilities, the customer must specify to Comcast which disposition should be taken. The default disposition is to discard these L2CP service frames.

ETHERNET PRIVATE LINE SERVICE TECHNICAL DESCRIPTION

Destination MAC Address	Layer 2 Control Protocol	L2CP Frame Disposition
01-80-C2-00-00-00	STP, RSTP, MSTP	Tunnel (All UNIs)
01-80-C2-00-00-01	PAUSE	Discard (All UNIs)
01-80-C2-00-00-02	LACP, LAMP	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-02	Link OAM	Peer or Discard (disposition specified per UNI)
01-80-C2-00-00-03	802.1X	Tunnel (All UNIs)
01-80-C2-00-00-07	E-LMI	Tunnel (All UNIs)
01-80-C2-00-00-0E	LLDP	Tunnel (All UNIs)
01-80-C2-00-00-20 through 01-80-C2-00-00-2F	GARP, MRP	Tunnel (All UNIs)

Figure 5: L2CP Frame Disposition

Section 2. Monitoring, Technical Support and Maintenance

2.1 Network Monitoring. Comcast monitors all Comcast Services purchased by a customer on a 24x7x365 basis.

2.2 Technical Support. Comcast provides customers a toll-free trouble reporting telephone number to the customer Enterprise Technical Support (ETS) that operates on a 24x7x365 basis. Comcast provides technical support for service-related inquiries. Technical support will not offer consulting or advice on issues relating CPE not provided by Comcast.

2.3 Escalation. Reported troubles are escalated within the Comcast ETS to meet the standard restoration interval described in the Service Level Objectives. Troubles are escalated within the Comcast ETS as follows: Supervisor at the end of the standard interval plus one hour; to the Manager at the end of the standard interval plus two hours, and to the Director at the end of the standard interval plus four hours.

2.4 Maintenance. Comcast's standard maintenance window is Sunday to Saturday from 12:00am to 6:00am local time. Scheduled maintenance is performed during the maintenance window and will be coordinated between Comcast and the customer. Comcast provides a minimum of forty-eight (48) hour notice for non-service impacting scheduled maintenance. Comcast provides a minimum of seven (7) days notice for service impacting planned maintenance. Emergency maintenance is performed as needed.

Section 3. Service Level Objectives

Comcast provides Service Level Objectives for the service, including network availability, mean time to respond, and mean time to restore. The service objectives are measured monthly from the Comcast point of demarcation.

3.1 Availability. Availability is a measurement of the percentage of total time that the service is operational when measured over a 30 day period. Service is considered "inoperative" when either of the following occurs: (i) there is a total loss of signal for the service, (ii) output signal presented to the customer by Comcast does not conform to the technical specifications in Section 1.

3.2 Mean Time to Respond. Mean Time to Respond is the average time required for the ETS to begin troubleshooting a reported fault. The Mean Time to Respond objective is fifteen (15) minutes upon receipt of a fault notification or from the time a trouble ticket is opened with the ETS.

3.3 Mean Time to Restore. Mean Time to Restore is the average time required to restore service to an operational condition as defined by the technical specifications in Section 1 of this document. The Mean Time to Restore objective is four (4) hours for electronic equipment failure or six (6) hours for fiber optic facilities failure from the time a trouble ticket is opened with the ETS.

Section 4. Customer Responsibilities

Comcast provides CPE for provisioning its services and the delivery of the UNI. Comcast will retain ownership and management responsibility for this CPE. As a result, the CPE must only be used for delivering Comcast services. Customers are required to shape their egress traffic to the contracted CIR.

Customers have the following responsibilities related to the installation, support, and maintenance of the Service.

4.1 Provide an operating environment with temperatures not below fifty-five (55) or above eighty-five (85) degrees Fahrenheit. Humidity shall not exceed ninety (90) percent at eighty-five (85) degrees Fahrenheit.

4.2 Provide secure space sufficient for access to one (1) standard, freestanding, equipment cabinet at each of the customer facilities, no further than fifty feet from the customer router or switch interface.

4.3 Provide outside cable entry conduit(s), entry cable ground point, and internal building conduit to allow Comcast the ability to rod/rope a fiber optic cable to the point of demarcation.

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Section 5. Definitions

5.1 Latency. Latency, also known as Frame Delay, is defined as the maximum delay measured for a portion of successfully delivered service frames over a time interval.

5.2 Jitter. Jitter, also known as Frame Delay Variation, is defined as the short-term variations measured for a portion of successfully delivered service frames over a time interval.

5.3 Packet Loss. Packet Loss, also known as Frame Loss, is the difference between the number of service frames transmitted at the ingress UNI and the total number of service frames received at the egress UNI.

COMCAST BUSINESS