
CenturyLink Advanced Voice Services Guide

(not applicable to services offered under the CenturyLink Wholesale and Enhanced Services Agreements)

- **IP Long Distance Service**
- **IP Toll Free Service**

Internet Protocol (“IP”) VOICE SERVICES

1.0 General Service Descriptions

IP Long Distance (outbound from the customer) allows CenturyLink customers to terminate traffic to the Public Switched Telephone Network (“PSTN”), domestically and internationally, using an IP-based interface. Customers must deliver all traffic to CenturyLink using Voice over Internet Protocol (“VoIP”) in Session Initiation Protocol (“SIP”) format. **This Service does not support local calling and thus does not include the following; 911, E911, operator services, local number portability or local directory listings. Operator Assistance (0+), Virtual Network Service, Project Account Codes (PAC) and Verified Project Account Codes are not supported at this time.**

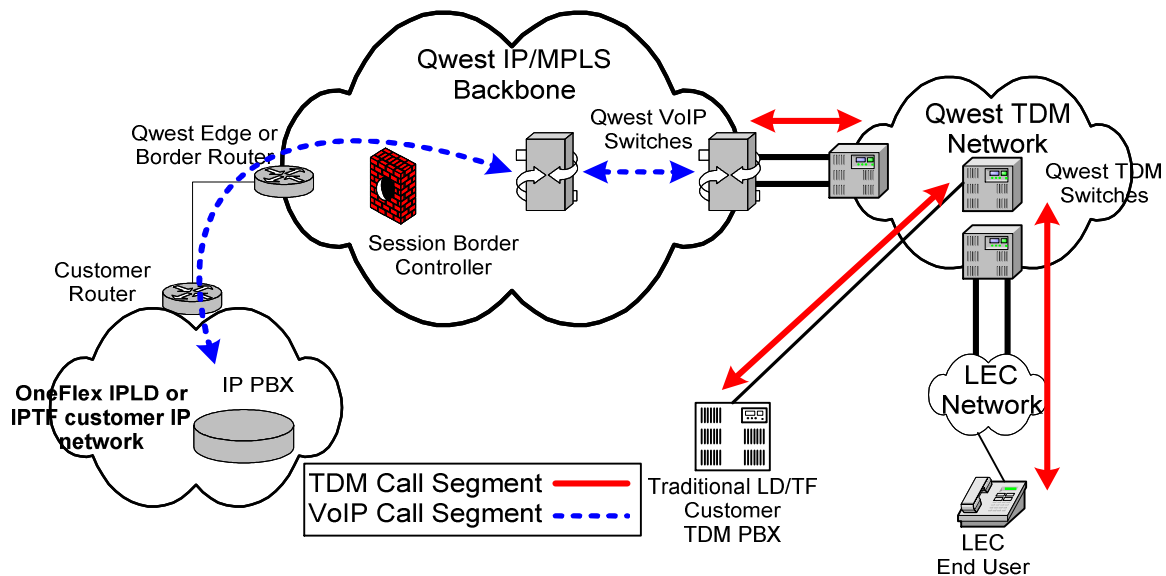
IP Toll Free service (inbound to the customer) allows CenturyLink customers to receive 8XX toll free traffic from the domestic PSTN, using an IP-based interface. Customers must receive all traffic from CenturyLink using VoIP in SIP. This service supports most 8XX features including enhanced services, except Transfer and Release. **This Service does not support local calling and thus does not include the following: 911, E911, operator services, local number portability or local directory listings.**

2.0 Applicability of Technical Specifications

The specifications in this section of the CenturyLink IP Voice Services Guide provide the main technical requirements that customers must satisfy in order to use:

- IP Long Distance Service
- IP Toll Free Service.

As the IP LD call flow diagram below represents, calls originate within the IP PBX (or similar device capable of transmitting voice as IP packets) and are sent to a customer router connected to the Internet with CenturyLink IQ™ Networking Internet Port or any other customer provided public Internet connection.



IP LD and IP TF Call Flow Diagram

This Internet connection will pass the call off to a CenturyLink edge or border router where it will enter our OC-192 multi-protocol label switched (MPLS) network and terminates the calls to the PSTN number destination.

The same underlying call flow applies to IP Toll Free service but just in reverse. A PSTN customer originates an 8xx call destined for an IP PBX. This 8xx call will be recognized as a CenturyLink IP 8xx call (because the 8xx number is provisioned as IP Toll Free service) and passed to the customers IP PBX over a public Internet connection and router.

As customers share CenturyLink resources utilized in providing these IP Voice Services, all traffic must comply with these requirements so that other customers using CenturyLink IP Voice Services are not adversely impacted. CenturyLink reserves the right to refuse to accept, suspend or limit any or all traffic that does not satisfy these requirements or that CenturyLink believes is adversely affecting other customers or the CenturyLink network. CenturyLink may alter the specifications of the IP Voice Services from time to time in order, among other reasons, to keep pace with market developments. Such alterations may impact the specific technical requirements that customers must satisfy in order to continue to use IP Voice Services.

2.1. Technical Requirements:

2.1.1. IP Long Distance Service

Customer traffic must utilize SIP for VoIP signaling and satisfy these primary specifications set forth in each of the following IETF Requests for Comments ("RFC") (Customers may refer to the IETF web site <http://www.ietf.org/> for more information on these technical specifications.):

- IP – RFC 791 (RFC 1918 not supported)
- User Datagram Protocol ("UDP") - RFC 768
- Real-Time Transport Protocol ("RTP") and Real-Time Transport Control Protocol ("RTCP") – RFC 1889

2.1.2. IP Toll Free Service

Customer traffic must utilize SIP for VoIP signaling and satisfy these primary specifications set forth in each of the following IETF RFCs:

- IP – RFC 791 (RFC 1918 not supported)
- UDP - RFC 768
- RTP and RTCP – RFC 1889

2.2 VoIP Signaling: CenturyLink accepts the following signaling protocols:

SIP, RFC 3261 with Session Description Protocol, RFC2327

- UDP transport only
- SIP redirect is not supported
- SIP refer is not supported
- Internet Low Bitrate Codec (iLBC) is not supported
- Dual Tone Multi-Frequency (DTMF) Signaling Options: Customers must send OneFlex Long Distance Service or accept OneFlex Toll Free Service telephony tones from CenturyLink on a per call basis in any one of the following methods:
 - In-band signaling (G.711 only)
 - Out-of-band signaling using RFC2833
 - Out-of-band signaling using SIP INFO
 - Out-of-band signaling using RFC2833 and SIP INFO

Other Signaling Requirements

- CenturyLink allows up to fifteen (15) IP public addresses per IP trunk group for IP Long Distance Service. Each address must be an IP address and not a fully qualified domain name ("FQDN"). The UDP must be an IP Addresses. Within the SIP header CenturyLink will accept an FQDN (with no DNS lookup) with the IP Address for IPLD only. Customers must provide CenturyLink with all of their initial IP addresses during the order process. Changes, additions or deletions of IP Addresses are made by placing an order.
- CenturyLink allows only one (1) IP public address per IP trunk group for IP Toll Free Service. The UDP and SIP headers must be an IP address and not a FQDN. Customers must provide CenturyLink with their IP address during the order process. Changes of IP Addresses are made by placing an order.
- Customers' signaling traffic will comply with the signaling rate (calls per seconds) specified below (see section 4.0.)
- The dialed number (DNIS) in the signaling for IP Toll Free Service will meet the following standard:
 - Passed in the request URI field and will be a minimum of two digits and no more than 10 digits. Customer must specify required DNIS value per 8xx number at initial ordering. The dialed number in the signaling for IP Long Distance Service must meet one of the following:
 - U.S. Domestic destinations using 10 digit (E.164) numbers or 10 digits with a leading 1 (1-xxx-xxx-xxxx).
 - International phone numbers (E.164) using a leading 011 or +011 string
 - U.S. Domestic Toll free using 10 digit (E.164) numbers or 10 digits with a leading 1 (1-8xx-xxx-xxxx).
- CenturyLink supports p-asserted-identity for privacy (IETF RFC 3325).
- For IP Toll Free Service, CenturyLink sends Originating Line Information ("OLI") in SIP From: field

Example OLI Header:

From: <sip:9998887777@10.10.10.10:5060;isup-oli=0>;tag=gK0e20f0fe

- CenturyLink does not initiate session timers.
- CenturyLink does not globalize numbers in SIP headers (by default). Available upon request.

3.0 VoIP Audio Encoding:

VoIP audio will be delivered by CenturyLink for IP Toll Free Service and IP Long Distance Service using RTP, UDP over IP protocol.

SIP does not limit the number of destination IPs for media. All addresses must be public IP addresses and not FQDNs.

IP Voice Services support the following voice CODECs:

- G.711 ulaw
- G.711 alaw
- G.729A (no silence suppression)* or G.729AB (silence suppression)**
- No other CODECs (such as G.723, G.726 or GSM) are supported

SDP for G.729 must comply with RFC3555. If customer requests "G.729" CenturyLink formats that as G.729AB.

Examples:

*G729A Example:

```
m=audio 10964 RTP/AVP 18
a=rtpmap:18 G729/8000
a=fmtp:18 annexb=no
a=sendrecv
a=ptime:20
```

**G729AB Supported example:

```
m=audio 10946 RTP/AVP 18
a=rtpmap:18 G729/8000
a=sendrecv
a=ptime:20
```

The supported payload sample sizes are 10, 20, and 30 ms. CenturyLink recommends customers use 20 ms.

T.38 fax is supported with G.711 / G.729 CODEC. CenturyLink by default supports T.38 fax on G.729. Customers must request T.38 fax support on G.711 if required during initial ordering.

Customer must supply preferred codec list and payload sample size per codec during initial ordering.

4.0 Maximum Number of Calls per Second (“CPS”)

Table 1 - Maximum number of CPS per source/destination address pair based on the maximum number of sessions ordered at provisioning.

| Protocol | Number of Simultaneous Calls Ordered from CenturyLink | Call Rate in Calls per Second |
|----------|---|-------------------------------|
| SIP | 1-249 | 2 |
| SIP | 250-399 | 3 |
| SIP | 400-599 | 5 |
| SIP | 600-899 | 7 |
| SIP | 900-1000 | 11 |

- Customer traffic is policed during call setup to the applicable Number of Simultaneous Calls the customer has ordered and CPS set by CenturyLink.
- Qwest will have no continuing obligation to accept or deliver traffic above the levels set forth in Table 1 and may, without notice, cease to accept or deliver such traffic.
- Customer equipment should work within the CPS limitations of the provisioned trunk group. Predictive Dialers/Auto Dialers often have trouble staying within the CPS limits of IPLD SIP trunk groups. Calls exceeding the CPS may fail.

5.0 Access to CenturyLink IP Network:

Customers may access IP Voice Services using either of the following:

- CenturyLink provided IP transport (e.g., CenturyLink IQ Networking, legacy DIA) [some customers will have legacy DIA in place and that does not need to be upgraded to iQ for this product]
- Customer provided public Internet access

For customers utilizing CenturyLink provided IP Ethernet transport services (such as CenturyLink IQ Networking service), the following Maximum Number of Calls/Sessions by IP transport bandwidth apply:

| Customer iQ Bandwidth | Maximum Calls G.711 (20 ms sample) | Maximum Calls G.729 (20 ms sample) | Maximum Calls G.729 (30 ms sample) |
|-----------------------|------------------------------------|------------------------------------|------------------------------------|
| DS-1 | 14 | 33 | 45 |
| DS-3 | 400 | 970 | 1330 |
| Fast Ethernet | 900 | 2100 | 2980 |
| OC-3 | 1400 | 3,400 | 4630 |

Maximum number of calls based on access bandwidth

For customers using public internet access, Maximum Calls per Bandwidth is not a helpful calculation because the public internet is “best effort.” Access is constrained to the provisioned number of sessions. CenturyLink may adjust a customers provisioned sessions based on historical traffic characteristics.

6.0 Document Change Management:

CenturyLink reserves the right to amend any of the provisions contained in this IP Voice Services Guide for any reason, including without limitation, in order to improve CenturyLink network efficiency, to address security threats, or to comply with applicable law or regulation. Any such amended provision will be effective 30 days after it is posted to the CenturyLink Web site as a part of the IP Voice Services Guide.

7.0 Glossary:

- Dialed number – the output digit string (1 – 10 digits) after applying the customer’s translation to the originally dialed 800 number
- Dialed number identification service (DNIS) – the original 800 number dialed by the caller (or any 2 to 10 digit number defined for that dialed 8xx number by the customer during the ordering process or updated via Q.Control) is delivered in the signaling/messaging to the customer. Oftentimes DNIS is used by ACD systems to distinguish call types when multiple 800 numbers are routed to the same destination.
- IP Trunk Group – a routable and CAC-controlled entity for VoIP traffic destined to a customer’s IP endpoints.