Pre-Digital Phone Line (PDPL)

Technical Specification

Issue 2.0

July 2024

Issue no: 2.0
Date: JULY 2024

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Introduction

Pre-Digital Phone Line (PDPL) is an interim technical capability that helps to move customers off the PSTN (Public Switched Telephone Network) where there is no alternate digital solution today. PDPL will emulate (as close as possible) a traditional phone line, but within a modern network.

Within this Technical Specification, we will cover;

- The two different Pre-Digital Phone Line (PDPL) profiles
- Line ringing patterns
- The current that will be sent down the line
- Codecs that PDPL will use
- Faxes
- Interdigit timers
- Network features
- End of call signal
- DTMF
- Devices Testing

Not all devices connected to the PSTN will be compatible with PDPL and this document is an overview of expected capabilities subject to testing.

We strongly urge you to test the end devices in our labs prior to migration. Please see section 'Devices: Register for testing' at the end of this document.

PDPL Profiles

There are two profiles that can be selected when provisioning Pre-Digital Phone Line (PDPL).

1) Voice, plus Voice Band Data; referred to hereafter as the "mixed profile"
2) Voice Band Data (VBD) profile

Mixed Profile

Where an end device predominantly makes and receives voice calls, the mixed profile will be most suitable.

When the mixed profile is provisioned, the port is established in Voice mode and will therefore have the technical configuration for voice calling, such as echo cancellation enabled and dynamic de-jitter buffers. The packetization time will be set to 20ms and Packet Loss Concealment (PLC) active.

The mixed profile relies on modem answer tones (e.g. 2100 Hz) to adapt the profile to VBD working. When this happens, the de-jitter buffers will be fixed and the echo canceller removed if indicated on the modem answer tone by periodic phase reversals.

You will not need to manually switch between voice and VBD on the mixed profile due to the auto detect feature.

VBD profile

Where an end device predominantly makes and receives Voice Band Data calls, the VBD profile will be most suitable.

It will be especially beneficial where modem types do not fully conform to international standards and employ a full V.25 or Bell 103 startup sequence, for example, and hence allow time for the port to change over to VBD working before data transmission commences.

When the VBD profile is provisioned, the port is established in VBD mode at the outset and programmed to expect modem signals. It does not need to adapt from Voice to VBD mode which can cause a transmission path interruption. Technically, echo cancellation will be enabled, without NLP (Non-Linear Processing), de-jitter buffers will be fixed, PLC disabled and the packetisation time will reduce to 10ms. If a modem answer tone is received with periodic phase reversals, the echo canceller will be removed. It is important to note, we still expect voice calls to be able to deliver a suitable experience on the VBD profile.

Line Ring Patterns and Cadences

PDPL will use the standard UK line ring pattern and cadence, i.e.

0.4s on, 0.2s off, 0.4s on, 2s off.

Line Loop Currents and Line Voltage

PDPL will have the following current sent down the line:

- 24 mA +/- 1mA
- -50 +/- 1 Volt
- REN (Ring Equivalent Number) of 4, subject to testing.

This current is not expected to diminish, and hence will emulate PSTN.

Line Length

PDPL line ports will support lines with up to 15dB loss at 1600 Hz.

In effect, this should emulate PSTN (subject to testing).

Voice Codecs

PDPL will emulate the PSTN and will therefore use ITU-T G.711 A-Law encoding. We will not be able to setup calls using G.711 µ-Law or G.729 codecs.

PDPL will also not support High Definition voice (e.g. ITU-T G.722).

G.711 A-Law – This ITU codec dating back to 1972 is the encoding used in the national PSTN network as all voice conversations are already digitally transmitted. Using this codec therefore implies that the voice samples do not need any transcoding until they reach the distant telephone exchange at the far end. This codec alone has a payload of 64 kbps, but when IP and Ethernet overheads are added, this rises to ~ 100kbits (with 20ms packetisation) and ~120kbps (with 10ms packetization)

Fax

G.711 pass-through may be supported (subject to testing), allowing fax modem signals to be sent over the media path. T.38 fax relay support will not be provided.

To check that your Fax machine is compatible with our service please register for testing at the end of this document.

Calling & Network features

PDPL supports the following features:

3 Way Calling	Admin Controlled Call Diversion
Caller Display	Admin Bar use of 1471 & 1471 Call Return
Call Diversion	Admin Bar use of 141 & Admin Bar use of 1470 release
Call Waiting	Admin Outgoing Call Barring - Almost all calls (excluding 999)
Incoming Call Barring	Admin Outgoing Call Barring - Mobile Calls
Out Going Call Barring	Admin Outgoing Call Barring - Premium Rate Calls
Permanent Withhold Number	Admin Outgoing Call Barring - Bar 123 & 118xxx calls
Anonymous Call Reject	Admin Outgoing Call Barring - International & Premium Rate Calls
Direct Connect	Admin Outgoing Call barring - International, Mobile & Premium Rate
	Admin Outgoing Call Barring - International Calls
	Admin Incoming Call Barring (excluding 999)
	Admin PIN Change/Reset - Outgoing Call Barring

PDPL will **not** support the following features:

Admin Bar use of 141
Admin Bar use of 1471 Call Return
Admin Bar use of 1470 Release
Admin Bar use of 123 Speaking clock
Admin Bar use of 1571 Call Return
Admin Indirect Access (Phone Cards)
Admin Call Barring (for BT Basic)
Admin Ring Back Inhibit
Call Tracker
Carrier Pre-Select
Smart Divert
Ring Back When Free (RBWF)

Ring Back
Caller Redirect
Reminder Call / Alarm Call
Call Sign
Bypass Number
Chose to Refuse
Nuisance Call Management (aka BT Call Protect)
Admin Indirect Access (Phone Cards) Call Barring (for BT Basic)
Caller Redirect/Call number intercept
Remote Call Forwarding

Voicemail

PDPL supports the following Voicemail options:

BT Answer 1571
Call Minder

Signalling Method and Interdigit Timers

PDPL Lines will support Loop Disconnect (Pulse) dialling or Dual Tone Multi-Frequency (DTMF) dialling.

For DTMF dialling, the tones must be applied for a minimum of 40ms to be detected and removed for a minimum of 40ms for an Inter Digit Pause (IDP) to be detected.

For Loop Disconnect (LD) signalling, a period of greater than 200 milliseconds will be taken as an IDP.

All other DTMF and pulse dialling technical characteristics will be as per the PSTN.

The line will be set to unattainable after 20 secs of dial tone.

Like PSTN, PDPL will also have an Off-Hook Howler however the tone will be different.

DTMF Tones

Dual Tone Multi Frequency (DTMF) tones will be handled on both profiles for inbound and outbound traffic. Both profiles will also be able to detect ABCD (alphabet) digits.

Mixed Profile In the mixed profile, DTMF digits sent post dialling are handled as RFC2833 telephone events when the port is working in voice mode. If however the port switches to VBD mode, DTMF digits will be handled as in-band tones.

VBD Profile The VBD profile will handle DTMF digits sent post dialling as in-band audio tones.

End of Call Signal

PDPL lines will provide an End of Call or “k” break signal of ~100ms to the called party when the calling party clears but the called party remains off hook. If the called party continues to remain off hook, a disconnect clear sequence will begin that eventually results in Howler tone and line parking.

The line will be sent to unattainable after 20 secs of dial tone.

PDPL will also have an Off-Hook Howler (which is similar to PSTN), however the tone may be different.

Calling Line Identity Display (CLID)

When the Caller Display service is active on a PDPL line, it will send the Calling Line Identity (CLI)/Presentation Number (PN) to the called terminal (if available and marked presentation allowed) using the ETSI Frequency Shift Keying (FSK) method with Power Ringing.

This is the same method used on PSTN Lines as defined in Openreach Supplier Information Note 227.

The CLI presentation/restriction rules will follow those used on the PSTN.

Devices: Register for Testing

Not all devices connected to the PSTN will be compatible with PDPL.

We strongly urge you to test your end devices in our Digital Services test lab at Adastral Park in Ipswich prior to migration.

Here you will be able to connect your device prior to migration to one of our PDPL lines and test it.

To arrange a visit, please register here or scan the QR code below:

We **will not guarantee** any device connected post migration will be supported.

Change Control

Version	Date	Author	Comments
1	March 2024	PDPL Product Team	Initial version
2	July 2024	PDPL Product Team	Calling & Network Features List updated