

G.729 for Asterisk® : Guidelines for Implementation

[G.729](#) is one of the most popular voice compression protocols used in IP telephony. This is due to the fact that G.729 reduces the bandwidth usage for a standard telephone call from 80 kilobits per second (kbps) to 24 kbps, with minimal voice quality degradation¹.

While in the past the G.729 algorithm ran on dedicated Digital Signal Processors ([DSP](#)), today's processors can easily run the G.729 algorithm effectively while addressing other tasks as well.

This document describes how to add the open G.729 codec to Xorcom's [XR1000](#), [XR2000](#) and [XR3000](#) stand-alone IP-PBX appliances:



Figure 1: XR1000 IP-PBX for Small Office / Home Office



Figure 2: XR2000 IP-PBX for Small/Medium Business



Figure 3: XR3000 IP-PBX for Enterprise

¹ The given bandwidth values are calculated for 20 ms payload packets with IP, UDP and RTP headers.

Conversion Times Based on Compression Method

G.729 requires CPU resources. The [tables at the end of this document](#) show the conversion time (using different compression methods) that can be achieved by each member of Xorcom's IP-PBX family.

Methods for Obtaining the G.729 Codec

There are two ways to obtain the G.729 codec for an Asterisk-based IP-PBX:

1. [Buy the licenses from Digium](#)
2. Install the Open Source version

Both codec versions provide the same performance, but in case of the Open Source version you undertake the responsibility for payment of the license fee. The legal aspects of using the Open Source version of the G.729 codec are discussed in the following article: <http://voip-info.org/wiki/view/Asterisk+G.729+Licensing>

Installing the Open Source G.729 Codec

To install the Open Source implementation of G.729 codec on the Xorcom XR1000/2000/3000 perform the following actions:

1. Download the codec binary file from http://asterisk.hosting.lv/bin/codec_g729-ast14-gcc4-glibc-pentium4.so
2. Copy it to the `/usr/lib/asterisk/modules` folder.
3. Restart the Asterisk:

```
/etc/init.d/asterisk restart
```

or

```
amportal restart
```

Estimating the Number of G.729 Channels Required

If you choose to purchase the G.729 license from Digium you will need to compute the number of G.729 channels required by your configuration.

You can estimate the required value by using the following information:

- a call between two SIP extensions usually requires two G.729 channels, unless the pass-thru mode is used (<http://voip-info.org/wiki/view/Asterisk+G.729+pass-thru>), in which case it doesn't require any G.729 channel.
- a call between a SIP extension and a Zaptel/DAHDI extension/trunk requires one G.729 channel.
- a call to Voice Mail or another Asterisk service where IVR messages must be played requires one G.729 channel.

Typical Translation Time Between Formats: XR3000

The following table contains the values of typical translation time between formats (in milliseconds) for one second of data source format (rows) to destination format (columns) in the Xorcom XR3000 IP-PBX appliance:

Data Source Format ⬇	Destination Format												
	G723	GSM	μ -law	a-law	G726-aal2	ADPCM	SLIN	LPC10	G729	Speex	iLBC	G726	G722
G723	-	-	-	-	-	-	-	-	-	-	-	-	-
GSM	-	-	2	2	2	2	1	3	5	13	-	2	-
μ -law	-	5	-	1	2	2	1	3	5	13	-	2	-
a-law	-	5	1	-	2	2	1	3	5	13	-	2	-
G726-aal2	-	5	2	2	-	2	1	3	5	13	-	1	-
ADPCM	-	5	2	2	2	-	1	3	5	13	-	2	-
SLIN	-	4	1	1	1	1	-	2	4	13	-	1	-
LPC10	-	5	2	2	2	2	1	-	5	13	-	2	-
G729	-	5	2	2	2	2	1	3	-	13	-	2	-
Speex	-	6	3	3	3	3	2	4	6	-	-	3	-
iLBC	-	-	-	-	-	-	-	-	-	-	-	-	-
G726	-	5	2	2	2	2	1	3	5	13	-	-	-
G722	-	-	-	-	-	-	-	-	-	-	-	-	-

Typical Translation Time Between Formats: XR2000

The following table contains the values of typical translation time between formats (in milliseconds) for one second of data source format (rows) to destination format (columns) in the Xorcom XR2000 IP-PBX appliance:

Data Source Format ⬇	Destination Format												
	G723	GSM	μ -law	a-law	G726-aal2	ADPCM	SLIN	LPC10	G729	Speex	iLBC	G726	G722
G723	-	-	-	-	-	-	-	-	-	-	-	-	-
GSM	-	-	3	3	4	3	2	6	11	25	-	4	-
μ -law	-	6	-	1	3	2	1	5	10	24	-	3	-

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Data Source Format	Destination Format												
	G723	GSM	μ -law	a-law	G726-aal2	ADPCM	SLIN	LPC10	G729	Speex	iLBC	G726	G722
a-law	-	6	1	-	3	2	1	5	10	24	-	3	-
G726-aal2	-	7	3	3	-	3	2	6	11	25	-	1	-
ADPCM	-	6	2	2	3	-	1	5	10	24	-	3	-
SLIN	-	5	1	1	2	1	-	4	9	23	-	2	-
LPC10	-	8	4	4	5	4	3	-	12	26	-	5	-
G729	-	7	3	3	4	3	2	6	-	25	-	4	-
Speex	-	8	4	4	5	4	3	7	12	-	-	5	-
iLBC	-	-	-	-	-	-	-	-	-	-	-	-	-
G726	-	7	3	3	1	3	2	6	11	25	-	-	-
G722	-	-	-	-	-	-	-	-	-	-	-	-	-

Typical Translation Time Between Formats: XR1000

The following table contains the values of typical translation time between formats (in milliseconds) for one second of data source format (rows) to destination format (columns) in the Xorcom XR1000 IP-PBX appliance:

Data Source Format	Destination Format												
	G723	GSM	μ -law	a-law	G726-aal2	ADPCM	SLIN	LPC10	G729	Speex	iLBC	G726	G722
G723	-	-	-	-	-	-	-	-	-	-	-	-	-
GSM	-	-	24	24	53	26	23	74	93	279	-	54	-
μ -law	-	83	-	1	31	4	1	52	71	275	-	32	-
a-law	-	83	1	-	31	4	1	52	71	275	-	32	-
G726-aal2	-	110	29	29	-	31	28	79	98	302	-	1	-
ADPCM	-	84	3	3	32	-	2	53	72	276	-	33	-
SLIN	-	82	1	1	30	3	-	51	70	274	-	31	-
LPC10	-	121	40	40	69	42	39	-	109	313	-	70	-
G729	-	107	26	26	55	28	25	76	-	299	-	56	-

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Data Source Format ☎	Destination Format												
	G723	GSM	μ -law	a-law	G726-aal2	ADPCM	SLIN	LPC10	G729	Speex	iLBC	G726	G722
Speex	-	132	51	51	80	53	50	101	120	-	-	81	-
iLBC	-	-	-	-	-	-	-	-	-	-	-	-	-
G726	-	111	30	30	1	32	29	80	99	303	-	-	-
G722	-	-	-	-	-	-	-	-	-	-	-	-	-

For more information about this topic and/or Xorcom products in general, please contact us using the details below.

ⁱ Asterisk is a registered trademark of Digium, Inc.