



PBX Configuration Guide

Innovaphone V12

Vodafone One Fixed
Vodafone Corporate Net over IP



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1 Introduction

This document provides a summary of the test results and a detailed configuration description of Innovaphone V12, for interworking with the SIP trunking services Vodafone One Fixed and Vodafone Corporate Net over IP.

These results are achieved by a PBX approval process. During this approval process interoperability tests are executed between the named Vodafone services and Innovaphone V12.

The approval of a PBX is a prerequisite for it to be connected to the named Vodafone SIP trunking services and to avoid any interoperability issues between them.

The PBX vendor and Vodafone NL both cooperated in this approval process to make sure that the tests are done correctly and according to the Vodafone standards.

2 General Test Approach and Test Results

The general test approach is to configure a simulated enterprise site using Innovaphone V12. The PBX is configured to use the SIP trunking services for Vodafone One Fixed and Vodafone Corporate Net over IP. So, two SIP trunks are connected to the PBX.

2.1 PBX approval testing

During PBX approval testing, different call scenarios are used to test the features of both services. A summary of the approved features are indicated here:

Vodafone One Fixed

- G.711 A-law codec
- G.729a codec, with fall back to G.711
- Fax support G.711 pass-through
- Fax support T.38 (with fall-back to G.711)
- Privacy (according to RFC3325)
- DTMF (according to RFC2833)

Vodafone Corporate Net over IP

- G.711 A-law codec
- Privacy (according to RFC3325)
- DTMF (according to RFC2833)
- Forced on PBX (mobile originating)
- Forced on PBX (mobile terminating)



2.2 Hardware and software

The equipment used during this approval and the Vodafone network reference point are identified in the following table:

System	HW version	SW version
Vodafone SIP Gateway CPE	Cisco 2901	VF-CUBE 1.1
PBX components		
Innovaphone V12 signalling	IP 411	V12
Innovaphone V12 media	IP 411	V12

3 Vodafone NL SIP Certification Program (VSCP)

The approved features will result in a VSCP level. The test with Innovaphone V12 has resulted in the following VSCP level. The corresponding logo can be used by the PBX vendor.

Vodafone SIP Certified level:

Vodafone SIP certified Gold





4 PBX Configuration

This chapter provides an overview of the SIP trunk configuration on the Innovaphone V12 which was used during the test. There are two SIP trunks defined in the Innovaphone V12 PBX:

Vodafone One Fixed
Vodafone Corporate Net over IP

The PBX is configured to route all mobile destinations via the Vodafone Corporate Net over IP SIP trunk. This is also applicable for the short and long numbers of the mobile VPN users.

The PBX is configured to route all other PSTN destinations via the Vodafone One Fixed SIP trunk.

Overview PBX- objects for basic configuration:

Long Name	Name	No	HW-ID	Node	PBX	Filter	Groups	Fork	Config	Phone	Type
Template Default										config	Config Template
Trunk Line CNoIP	Trunk Line CNoIP			root	PBX-Heerlen						Trunk Line 127.0.0.1
PBX-Heerlen	PBX-Heerlen	**1		root	PBX-Heerlen						PBX
Trunk Line	Trunk Line	0		root	PBX-Heerlen						Trunk Line 127.0.0.1
Phone 01	Phone 01	2071	Phone 01	root	PBX-Heerlen	Pickup All!	+		Template Default	config	192.168.79.241
Phone 02	Phone 02	2072	Phone 02	root	PBX-Heerlen	Pickup All!	+		Template Default	config	192.168.79.242
Fax	Fax	2079	Fax	root	PBX-Heerlen		+				127.0.0.1
Mobile Phone 01	Mobile Phone 01	7701		root	PBX-Heerlen		+	00631048065*		+	
Mobile Phone 02	Mobile Phone 02	7703		root	PBX-Heerlen		+	00631048069*		+	
Mobility	Mobility	99		root	PBX-Heerlen						Mobility

Connection Innovaphone Gateway-PBX:

There are two connection between the Innovaphone gateway and the innovaphone PBX. The 'Trunk Line'- object with 0 is used to manage the external inbound calls while the "Trunk Line"- object without 0 is used to manage the routing for the inbound call internally in the PBX.

Long Name	Name	No	HW-ID	Node	PBX	Filter	Groups	Fork	Config	Phone	Type
Trunk Line	Trunk Line	0		root	PBX-Heerlen						Trunk Line 127.0.0.1
Trunk Line CNoIP	Trunk Line CNoIP			root	PBX-Heerlen						Trunk Line 127.0.0.1

To configure the trunk Line see the screenshots below

admin Help

IP411 Vodafone: innovaphone IP411

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

Interface: CGPN-In CDPN-In CGPN-Out CDPN-Out Alias: Trunk Line: 0 Registration Product: 127.0.0.1

GW1 PBX

Google Chrome

Not secure https://192.168.79.250/RELAY0/mod_cmd.xml?cmd=xml-ifs&id=GW1&xml=relay_edit_voip.xml

Name: PBX **Beschrijvende, vrij te kiezen naam.**

Disable:

Protocol: H.323 **Protocol: 'H.323'.**

Mode: Register as Gateway **Mode: 'Register as Gateway'.**

Address: 127.0.0.1 **Address: IP-adres van de PBX.**

Address: (alternate)

Gatekeeper Identifier

Local Signaling Port

Authorization

Password: Retype:

Alias List

Name	Number
Trunk Line	0 Naam en/of nummer van het 'Trunk Line'-object.

Media Properties

General Coder Preference: G711A Framesize [ms]: 20 Silence Compression: Exclusive:

Local Network Coder: G711A Framesize [ms]: 20 Silence Compression:

Enable T.38: Audio FAX support: No DTMF Detection: Enable PCM: Media-Relay: Off Video: No ICE:

SRTP Cipher: AES128/32 SRTP Key Exchange: SDES-DTLS **'Enable T.38': aangevinkt.**

Record to (URL):

H.323 Interop Tweaks

No Faststart: No H.245 Tunneling:

Suppress HLC: Suppress FTY: Suppress Subaddr:

OK Cancel Apply Delete Help

admin Help

IP411 Vodafone: innovaphone IP411

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

Interface	CGPN-In	CDPN-In	CGPN-Out	CDPN-Out	Alias	Registration	Product
GW1 PBX						Trunk Line 0	127.0.0.1
GW2 PBX CNoIP						Trunk Line CNoIP	127.0.0.1

GW2 PBX CNoIP - Google Chrome

Not secure 12.168.79.250/RELAY0/mod_cmd.xml?cmd=xml-ifs&id=GW2&xml=relay_edit_voip.xml

Name: PBX CNoIP **Beschrijvende, vrij te kiezen naam.**

Disable:

Protocol: H.323 **Protocol: 'H.323'.**

Mode: Register as Gateway **Mode: 'Register as Gateway'.**

Address: 127.0.0.1 **Address: IP-adres van de PBX.**

Address: (alternate)

Gatekeeper Identifier

Local Signaling Port

Authorization

Password: Retype

Alias List

Name	Number
Trunk Line CNoIP	

Naam en/of nummer van het 'Trunk Line'-object.

Media Properties

General Coder Preference: G711A Framesize [ms]: 20 Silence Compression: Exclusive:

Local Network Coder: G711A Framesize [ms]: 20 Silence Compression:

Enable T.38: **'Enable T.38': aangevinkt.**

Enable FAX support: No DTMF Detection: Enable PCM: Media-Relay: Off Video: No ICE:

SRTP Cipher: AES128/32 SRTP Key Exchange: SDES-DTLS

Record to (URL)

H.323 Interop Tweaks

No Faststart: No H.245 Tunneling:

Suppress HLC: Suppress FTY: Suppress Subaddr:

OK Cancel Apply Delete Help

As mention above there are two sip trunk which need to be configure in the PBX:

admin Help

IP411 Vodafone: innovaphone IP411

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

Interface	CGPN-In	CDPN-In	CGPN-Out	CDPN-Out	State	Alias	Registration
SIP1 VOF	i31--0 i--00	i31--0 i--00	000--00 00--00 7701--0631048065 7703--0631048069 207--038700207 !--0387002070				62.140.159.237
SIP2 VOF CNoIP	i31--0 i--00	i31--0 i--00 207--038700207	000--00 00--00 7701--0631048065 7703--0631048065 2072--2072 207--038700207 !--0387002070				62.140.159.238



4.1 SIP trunk configuration Vodafone One Fixed

Configuration VoF SIP Trunk Vodafone

The screenshot shows the SIP1 VOF configuration interface in Google Chrome. The URL is 192.168.79.250/RELAY0/mod_cmd.xml?cmd=xml-ifs&id=SIP1&xsl=relay_edit_sip.xml. The interface is divided into several sections:

- Name:** VOF (Annotation: Beschrijvende, vrij te kiezen naam.)
- Type:** Provider (Annotation: Type: 'Provider'.)
- Transport:** UDP (Annotation: Transport: 'UDP'.) Without registration: checked (Annotation: Without registration: checked.)
- Proxy:** 62.140.159.237 (Annotation: IP-adres van de Vodafone-server.)
- Authorization:** Username and Password fields. (Annotation: Enable T.38: 'aangevinkt'. No ICE: 'aangevinkt'. SRTP Key Exchange: 'No Encryption'.)
- Media Properties:** General Coder Preference: G711A, Framesize [ms]: 20, Silence Compression: Exclusive. Local Network Coder: G711A, Framesize [ms]: 20, Silence Compression: [unchecked]. Enable T.38: checked (Annotation: Enable T.38: 'aangevinkt'). No DTMF Detection: [unchecked]. Enable PCM: [unchecked]. Media-Relay: Off. Video: [unchecked]. No ICE: checked. SRTP Cipher: AES128/32, SRTP Key Exchange: No encryption.
- SIP Interop Tweaks:** Proposed Registration Interval [s]: [empty]. Accept INVITE's from Anywhere: [unchecked]. Enforce Sending Complete: [unchecked] (affects outgoing SIP calls only). No Video: checked (Annotation: No Video: 'aangevinkt'). To Header when Sending INVITE: Called Party (affects outgoing SIP calls only). From Header when Sending INVITE: CGPN in user part of URI (Annotation: From Header when Sending INVITE: 'CGPN in user part of URI'). Identity Header when Sending INVITE: CGPN in user part of URI. Reliability of Provisional Responses: Supported (affects outgoing SIP calls only). Microsoft Presence Format: [unchecked]. Advanced: [empty].
- Internal Registration:** Protocol: None.

Buttons at the bottom: OK, Cancel, Apply, Delete, Help.

* IP addresses and telephone numbers used during the approval tests can be different then used in real customer's setup.



4.2 SIP trunk configuration Vodafone Corporate Net over IP

Configuration CNoIP SIP trunk

The screenshot shows a configuration window for a SIP trunk. Blue arrows point to specific fields with Dutch annotations:

- Name:** VOF CNoIP. Annotation: "Beschrijvende, vrij te kiezen naam."
- Type:** Provider. Annotation: "Type: 'Provider'."
- Transport:** UDP. Annotation: "Transport: 'UDP'." Without registration: checked. Annotation: "Without registration: checked."
- Proxy:** 62.140.159.238. Annotation: "IP-adres van de Vodafone-server."
- Media Properties:**
 - Enable T.38: checked. Annotation: "Enable T.38: 'aangevinkt'."
 - No ICE: checked. Annotation: "No ICE: 'aangevinkt'."
 - SRTP Key Exchange: No encryption. Annotation: "SRTP Key Exchange: 'No Encryption'."
- SIP Interop Tweaks:**
 - No Video: checked. Annotation: "No Video: 'aangevinkt'."
 - From Header when Sending INVITE: CGPN in user part of URI. Annotation: "From Header when Sending INVITE: 'CGPN in user part of URI'."

IP addresses and telephone numbers used during the approval tests can be different then used in real customer's setup.

Configuration outbound routers:

The screenshot shows the "Routes" configuration page in the IP411 management interface. The table below lists the configured routes:

From	To	Counter	CGPN Maps
GW1:PBX	TONE: The Netherlands		From PBX To Tone (The Netherlands)
GW2:PBX CNoIP	MAP		Number Manipulations (CDPN)
0031 → 0	SIP1:VOF	bi	From PBX To SIP-Provider (International)
00 → 00	SIP2:VOF CNoIP	i	From PBX To SIP-Provider (Mobile - Short Numbers)
77 → 77	SIP2:VOF	i	From PBX To SIP-Provider (Mobile)
06 → 06	SIP1:VOF	i	From PBX To SIP-Provider (085-Numbers)
085 → 085	SIP1:VOF	i	From PBX To SIP-Provider (088-Numbers)
088 → 088	SIP1:VOF	bi	From PBX To SIP-Provider (08-Numbers)
08 → 08	SIP1:VOF	bi	From PBX To SIP-Provider (09-Numbers)
09 → 09	SIP1:VOF	i	From PBX To SIP-Provider (National)
0 → 0	SIP1:VOF	bi	From PBX To SIP-Provider (14 - City Numbers)
14 → 14	SIP1:VOF	bi	From PBX To SIP-Provider (Other)



Configuration for correct CLI for the outbound calls to the correct sip trunk.

IP411 Vodafone: innovaphone IP411

admin Help

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

Interface	CGPN-In	CDPN-In	CGPN-Out	CDPN-Out	State	Alias	Registration
SIP1 VOF	i31--0	i31--0	000--00	00--0			62.140.159.237
	i--00	i--00	7701--0631048065	7703--0631048069			
			207--038700207	i--0387002070			
SIP2 VOF CNoIP	i31--0	i31--0	000--00	00--0			62.140.159.238
	i--00	i--00	7701--0631048065	7703--0631048065			
			207--038700207	2072--2072			
			207--038700207	i--0387002070			

Configuration Inbound numbers format

IP411 Vodafone: innovaphone IP411

admin Help

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

Interface	CGPN-In	CDPN-In	CGPN-Out	CDPN-Out	State	Alias	Registration
SIP1 VOF	i31--0	i31--0	000--00	00--0			62.140.159.237
	i--00	i--00	7701--0631048065	7703--0631048069			
			207--038700207	i--0387002070			
SIP2 VOF CNoIP	i31--0	i31--0	000--00	00--0			62.140.159.238
	i--00	i--00	7701--0631048065	7703--0631048065			
			207--038700207	2072--2072			
			207--038700207	i--0387002070			

Configuration inbound routers:

IP411 Vodafone: innovaphone IP411

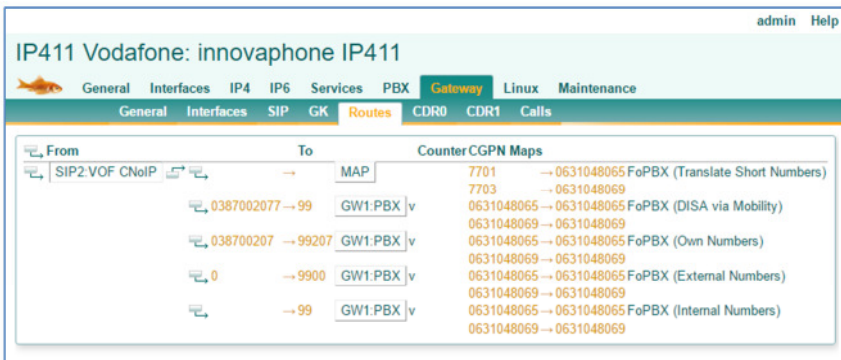
admin Help

General Interfaces IP4 IP6 Services PBX Gateway Linux Maintenance

General Interfaces SIP GK Routes CDR0 CDR1 Calls

From	To	Counter	CGPN	Maps
SIP1.VOF	SIP2.VOF CNoIP			
	0631048065 --7701	7	7	From SIP-Provider To PBX (CNoIP)
	0631048069 --7703			From SIP-Provider To PBX (Mobile Number 01)
	038700207 --207			From SIP-Provider To PBX (Mobile Number 02)
	i			From SIP-Provider To PBX (Direct Numbers)
				From SIP-Provider To PBX (Catch All)

Forced on PBX:



4.3 Configuration exceptions

In some cases the PBX default configuration settings have to be changed for specific features. These special settings are described here:

- No changes



5 Glossary

DTMF	Tones generated on a phone and send across a communications network (i.e. for menu selections in voicemail).
E.164	Standardized international type of number format on a communications network.
Fax support G.711 pass-through	Fax on an IP network, transported like a voice call.
Fax support (T.38 with fall-back to G.711)	Fax on an IP network, transported with a special mechanism (T.38), with fall-back to G.711 pass-through if T.38 is not supported by both sides.
Forced on PBX (mobile originating)	When a mobile phone makes a call to a destination, the call always traverses the PBX. Thereby providing call control to the PBX.
Forced on PBX (mobile terminating)	When a call is made towards a mobile phone, the call always traverses the PBX. Thereby providing call control to the PBX.
G.711 A-law	Sampling algorithm, used to digitize speech on a communications network.
G.729a	Sampling and compression algorithm, used to digitize speech on a communications network.
Gateway	Interconnection device between incompatible networks.
IP	Internet Protocol (addressing protocol on a computer network).
PBX	Private Branch eXchange or private telephone switch.
Privacy	Ability to hide one's identity on a communications network.
Short number	Non-public destination number used in private networks and PBX's.
SIP	Signalling protocol for media communication on an IP network.
T.38	Transport protocol to transport fax over an IP network.
Trunk	Communications channel.
Unknown number format	Number format "as dialled" on a phone.