



# Siemens Realitis / GPT iSDX using E1 DPNSS to Cisco Unified Communications Manager 7.1 via Cisco VG30D

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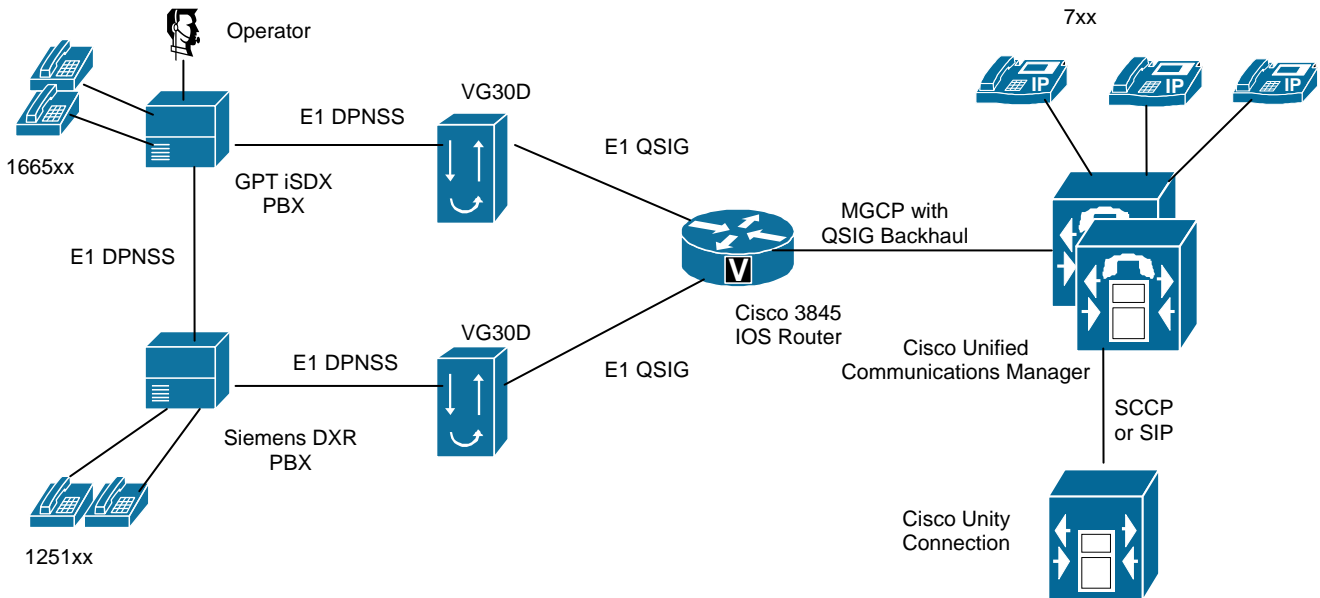
## Introduction

This application note provides configuration guidelines for interconnecting Cisco Unified Communications Manager with GPT iSDX, Siemens Realitis or DXR PBXs using DPNSS to standard BTNR 188. As Cisco Unified Communications Manager does not natively support this protocol, use of a Cisco VG30D voice gateway is required. This converts DPNSS to QSIG, mapping DPNSS features to their QSIG equivalent, where possible.

Using configuration settings in this application note, a high level of supplementary service integration was verified using the test network described below. This included basic call, call transfer, call conference, call forward, calling and connected names and numbers with some limitations on Caller ID features during transfer, forward, and conference scenarios. MWI was also passed from Cisco Unified Communications Manager to PBX phones and from the PBX to Cisco Unified Communications Manager. Successful inter-working of DPNSS Route Optimization with QSIG Path Replacement was achieved. Call Back services were shown to work – the exception being Call Back Next Used initiated from the Cisco Unified Communications Manager side, which produces an immediate response from the PBX.

## Network Topology

Figure 1. Network topology



A GPT iSDX and a Siemens DXR were connected via two Cisco VG30D voice gateways to a Cisco 3845 router with an NM-HD-2VE plus VWIC2-2MFT-T1/E1-E1 module running MGCP QSIG backhaul to a Cisco Unified Communications Manager 7.1(3) cluster. The iSDX-S hosted analogue phones and a standard three-piece operator console. The DXR hosted analogue and digital Optipoint 500 phones. PBX DLIs (Digital Line Interfaces) were then connected on G.703 to the VG30Ds and also between the PBXs. The VG30Ds were connected to the Cisco IOS gateway using a standard E1 cross-over cable, with the Cisco Unified Communications Manager cluster hosting a number of Cisco 7970, 7960 and 7940 phones running both SCCP and SIP. In order to prove MWI, a Cisco Unity Connection system version 7.1(2) was registered to Cisco Unified Communications Manager using SCCP. This system provided voice mail boxes for both CUCM and PBX hosted extensions.

## Limitations

When an IP Phone is called a free PBX extension and then initiated a Call Back Request, the PBX alerted Cisco Unified Communications Manager that the PBX phone was free immediately the IP Phone cleared down following the Call Back request. This is as a result of the QSIG Call Back request being sent while the PBX phone is in the alerting state i.e. before the original call is cleared. DPNSS mandates that the original call should be cleared automatically before the Callback Request is made. Consequently, the PBX sees a change from alerting state to free as evidence that the PBX phone has been used and so sends the free notification immediately. This behaviour appears to have been modified in some later versions of the PBX software. During the testing the iSDX running version 5.2 software exhibited the expected



behaviour but the DXR PBX running version 8 software did not send the immediate free notification and hence the callback service was successful.

Various iSDX Operator Console services are not supported due to either limitations in QSIG or Cisco Unified Communications Manager. Specifically, attempts to intrude on an IPT extension, over-ride diverts set on Cisco Unified Communications Manager, Camp-On to a busy IPT extension and request the Status of Destination from an IPT extension (e.g. dialing “100” followed by the IPT extension) will fail. However, Operator Return will function correctly – this is where a call is extended to an IPT extension which rings without answering. The Return timer on the PBX will force the call back to the operator showing as “Ring No Answer.”

Although any mode of PBX side (A/B) or Glare configuration (X/Y) is supported, fractional DPNSS and/or QSIG trunks are not supported.

On CallManager 4.1 during a supervised transfer from a PBX extension to another destination, the Connected Name displayed on the originating IP Phone does not update, and will continue to show the name of the first called destination. On later versions the name is updated when Path Replacement/Route optimization occurs.

Calls from the IPT phones to the iSDX Operator which are forwarded to PBX phones will not return to the console on Ring No Answer. This is due to the way in which incoming DPNSS calls are seen by the iSDX.

## System Components

### Hardware Requirements

The following hardware was required:

- Cisco Unified Communications Manager Cluster
- Cisco 3845 voice gateway + NM-HD-2VE + VWIC2-2MFT-T1/E1-E1
- Cisco VG30D
- Cisco Unity Connection Voice Mail
- GPT iSDX-S PBX plus operator console and analogue extensions
- Siemens DXR PBX with analogue and digital extensions

The Cisco 3845 gateway can be substituted with any other voice gateway with suitable E1 VWICS or Catalyst 6500 + CMM module with E1 ports, or Catalyst 6608 E1 module.

### Software Requirements

The following software was installed:

Equipment	Tested Software Revision(s)
Cisco Unified Communications Manager	7.1.3
Cisco 3845 voice gateway	Cisco IOS c3845-adventerprisek9_ivs-mz.124-22.YB2.bin



Cisco VG30D	R1.2.2
Cisco Unity Connection Voice Mail	7.1.2
GPT iSDX-S PBX	SDX 5.2
Siemens DXR PBX	DXR 8.0.31

The testing was initially performed against a Cisco Unified Communications Manager release 7.1.(3b) cluster. Further testing was performed against version 4.1.3, 5.1.2, 6.1.3 and 8.0.2 clusters. Where any deviations from the 7.1.3 results were found in a particular release they are listed under limitations. Any differences in configuration are highlighted in the Cisco Unified Communications Manager Configuration section.

## Features

This section lists supported features.

### Features Supported

Basic Call (Enbloc and Overlap dialing)  
Calling/Connected Number Display and Update  
Calling/Connected Name Display and Update (*see limitations*)  
Call Transfer: Supervised Local Transfer  
Call Transfer: Supervised Network/External Transfer  
Call Conference: Local  
Call Conference: Network/External  
Call Forward: Local  
Call Forward: Network/External  
Call Back When Free  
Call Back Next Used (*see limitations*)  
Return To Console – no answer (*see limitations*)  
Message Waiting Indication  
Route Optimisation / Path Replacement

## Configuration

### Configuring the DXR PBX

The configuration below is taken from the DXR PBX and shows only the configuration of the trunk to the Cisco VG30D.



Ensure Trunk Group has correct Trunk Access

?1tga

GROUP:10

ZONE:0

TAC 0 0 0 0 0 0 0 0 0 0 1 1 1 1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 3 3  
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1

MG010

Z 00 N

Configuration of Trunk Main Group – note Trunk Access code (CODE) of 1041

?1tmg 10

MG	TYPE	CODE	D / A	OUT	SRCH	SEND	PSD	A S	R T	IN	D T	D T	REG	T S	OG	M D	N L	R A	PE
010	DPNS	1041	D	HRS	FXD			A		DDI				N	N	00	N		I

Configuration of individual Trunk Channels showing X/Y setting (DIR) and Trunk Main Group number

?1tk p 0105-2

TK	TYPE	PAD	MG	TG	DIR	DSA	OAD	NSA	SIG	CCT	PSP
1681	DPNS	010501-2	010	010	Y	DDI	Y	DANS			038
1682	DPNS	010502-2	010	010	Y	DDI	Y	DANS			038
1683	DPNS	010503-2	010	010	Y	DDI	Y	DANS			038
1684	DPNS	010504-2	010	010	Y	DDI	Y	DANS			038
1685	DPNS	010505-2	010	010	Y	DDI	Y	DANS			038
1686	DPNS	010506-2	010	010	Y	DDI	Y	DANS			038
1687	DPNS	010507-2	010	010	Y	DDI	Y	DANS			038
1688	DPNS	010508-2	010	010	Y	DDI	Y	DANS			038
1689	DPNS	010509-2	010	010	Y	DDI	Y	DANS			038
1690	DPNS	010510-2	010	010	Y	DDI	Y	DANS			038
1691	DPNS	010511-2	010	010	Y	DDI	Y	DANS			038
1692	DPNS	010512-2	010	010	Y	DDI	Y	DANS			038
1693	DPNS	010513-2	010	010	Y	DDI	Y	DANS			038
1694	DPNS	010514-2	010	010	Y	DDI	Y	DANS			038
1695	DPNS	010515-2	010	010	Y	DDI	Y	DANS			038
1696	DPNS	010516-2	010	010	Y	DDI	Y	DANS			038
1697	DPNS	010517-2	010	010	Y	DDI	Y	DANS			038
1698	DPNS	010518-2	010	010	Y	DDI	Y	DANS			038
1699	DPNS	010519-2	010	010	Y	DDI	Y	DANS			038
1700	DPNS	010520-2	010	010	Y	DDI	Y	DANS			038
1701	DPNS	010521-2	010	010	Y	DDI	Y	DANS			038
1702	DPNS	010522-2	010	010	Y	DDI	Y	DANS			038
1703	DPNS	010523-2	010	010	Y	DDI	Y	DANS			038
1704	DPNS	010524-2	010	010	Y	DDI	Y	DANS			038
1705	DPNS	010525-2	010	010	Y	DDI	Y	DANS			038
1706	DPNS	010526-2	010	010	Y	DDI	Y	DANS			038



1707	DPNS	010527-2	010	010	Y	DDI	Y	DANS	038
1708	DPNS	010528-2	010	010	Y	DDI	Y	DANS	038
1709	DPNS	010529-2	010	010	Y	DDI	Y	DANS	038
1710	DPNS	010530-2	010	010	Y	DDI	Y	DANS	038

Display of DLI configuration, showing DPNSS A/B Side Setting (LINK) and the Real and virtual channels configured.

?1dlc

XXYY/LINK:0105-2

CHANNEL:a

TRUNK	TYPE	VIRTUAL	REAL	LINK
010501-2	DPNSS	C	C	B
010502-2	DPNSS	C	C	B
010503-2	DPNSS	C	C	B
010504-2	DPNSS	C	C	B
010505-2	DPNSS	C	C	B
010506-2	DPNSS	C	C	B
010507-2	DPNSS	C	C	B
010508-2	DPNSS	C	C	B
010509-2	DPNSS	C	C	B
010510-2	DPNSS	C	C	B
010511-2	DPNSS	C	C	B
010512-2	DPNSS	C	C	B
010513-2	DPNSS	C	C	B
010514-2	DPNSS	C	C	B
010515-2	DPNSS	C	C	B
010516-2	DPNSS	C	C	B
010517-2	DPNSS	C	C	B
010518-2	DPNSS	C	C	B
010519-2	DPNSS	C	C	B
010520-2	DPNSS	C	C	B
010521-2	DPNSS	C	C	B
010522-2	DPNSS	C	C	B
010523-2	DPNSS	C	C	B
010524-2	DPNSS	C	C	B
010525-2	DPNSS	C	C	B
010526-2	DPNSS	C	C	B
010527-2	DPNSS	C	C	B
010528-2	DPNSS	C	C	B
010529-2	DPNSS	C	C	B
010530-2	DPNSS	C	C	B
0105-2	MAINT	U	U	

System Digit Translation Pattern, showing routing for 70, 71, 72 and 79 via Access Code 1041

ldtt 3 7

71	104171
72	1041
73	1042



```
74          1043
75          1048
76          1049
77          1050
78          1051
79          104179
70          104170
```

Display the exchange identity (speid) and sprad. Cisco Unified Communications Manager should route 12<extension range> and 19804<everything> back to the PBX. Note the parameters required may vary with the configuration of the DPNSS network.

```
?lssp
SYSTEM PARAMETER? :speid
SPEID  011000  04608.  12--  0001 0010 0000 0000B
        000000  00000.  ----  0000 0000 0000 0000B
```

```
?lssp
SYSTEM PARAMETER? :sprad
SPRAD  014612  06538.  1980  0001 1001 1000 1010B
        040000  16384.  4---  0100 0000 0000 0000B
```

## Configuring the Cisco Unified Communications Manager

The relevant Communications Manager administration falls into three main areas, gateway, service parameters and routing. Configuration options vary between different versions of Communications Manager. These instructions are for Cisco Unified Communications Manager release 7.1.(3b) but where differences occur in other versions they are noted.

### Cisco Unified Communications Manager Gateway Interface Configuration

Firstly the gateway port(s) must be configured for the correct protocol options.

**Step 1** In Cisco Unified CM Administration, click **Devices** → **Gateway** → **Find** and select the gateway.

**Step 2** Select the **Module/Subunit/Port** for the interface to be configured.

**Step 3** Under the **Interface Information** section specify the **PRI Protocol Type** as **PRI ISO QSIG E1**.

**Note:** Prior to release 5.x the PRI Protocol Type was simply PRI QSIG E1.

**Step 4** Set the **QSIG Variant** to **ISO**.

**Step 5** Set **ASN.1 ROSE OID Encoding** to **Use Local Value**.

**Note** The parameters in steps 4 and 5 were not introduced until Cisco Unified Communications Manager release 7.

**Step 6** Set Protocol side to **User** ( Recommended but not essential).

**Step 7** Set the **Channel IE Type** to **Timeslot Number**.

Under the Product Specific Configuration Layout Section configure the following.

**Step 8** Set the **Line Coding** to **HDB3**.



**Step 9 Set Framing to CRC4.**

**Step 10** The **Clock** parameter should be set appropriately for the over all TDM network topology, external if clocking from the DPNSS PBX. See Step 6 of the Cisco VG30D configuration.

**Step 11** Click **Save** and then **Apply Config**.

Interface Information	
PRI Protocol Type*	PRI ISO QSIG E1
QSIG Variant*	ISO
ASN.1 ROSE OID Encoding*	Use Local Value
Protocol Side*	User
Channel Selection Order*	Top Down
Channel IE Type*	Timeslot Number
PCM Type*	A-law
Delay for first restart (1/8 sec ticks)*	32
Delay between restarts (1/8 sec ticks)*	4
<input checked="" type="checkbox"/> Inhibit restarts at PRI initialization	
<input type="checkbox"/> Enable status poll	
<input type="checkbox"/> Unattended Port	
<input checked="" type="checkbox"/> Enable G.Clear	

Call Routing Information - Inbound Calls	
Significant Digits*	All
Calling Search Space	City11Cluster4SubsCSS
AAR Calling Search Space	< None >
Prefix DN	

Call Routing Information - Outbound Calls	
Calling Party Presentation*	Allowed





**Product Specific Configuration Layout**

?

Line Coding*	HDB3
Framing*	CRC4
Clock*	External
Input Gain (-6..14 db)*	0
Output Attenuation (-6..14 db)*	0
Echo Cancellation Enable*	Enable
Echo Cancellation Coverage (ms)*	32

**Geolocation Configuration**

Geolocation	< None >
Geolocation Filter	< None >

Save Delete Reset Apply Config

## Cisco Unified Communications Manager Service Parameters

In order for some supplementary services to work successfully between QSIG and DPNSS a number of Cisco Unified Communications Manager Service Parameters must be changed from their default values. Browse to **System** → **Service Parameters**, (**Service** → **Service Parameters** on CallManager 4.x), select a server and then the CallManager service. All the required changes are 'cluster wide' so changes need only be made on the publisher within a cluster. Make the following changes.

**Step 1** In Cisco Unified CM Administration, open **System** → **Service Parameters**. (In CallManager 4.x open **Service** → **Service Parameters**).

**Step 2** Select the publisher server from the list of active servers.

**Step 3** Select **Cisco CallManager** from the drop down Service list.

Scroll down to **Cluster wide Parameters – Feature Forward**

**Step 4** Change the parameter **Retain forward Information** to **True**.

**Step 5** Change the parameter **Forward by Reroute enabled** to **True**.



**Clusterwide Parameters (Feature - Forward)**

<a href="#">Forward Maximum Hop Count</a> *	<input type="text" value="12"/>	12
<a href="#">Forward No Answer Timer</a> *	<input type="text" value="12"/>	12
<a href="#">Max Forward Hops to DN</a> *	<input type="text" value="12"/>	12
<a href="#">Retain Forward Information</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> False
<a href="#">Forward By Reroute Enabled</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> False
<a href="#">Transform Forward by Reroute Destination</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> True
<a href="#">Always Forward Switch Voice Mail Calls</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> True
<a href="#">Forward By Reroute T1 Timer</a> *	<input type="text" value="10"/>	10
<a href="#">Include Original Called Info for Q.SIG Call Diversions</a> *	<input type="text" value="Only after the first diversion"/>	<input type="button" value="v"/> Only after the first diversion
<a href="#">Set Private Numbering Plan for Call Forward</a> *	<input type="text" value="False"/>	<input type="button" value="v"/> False
<a href="#">Set Type of Number for Call Forward</a> *	<input type="text" value="Level1RegionalNumber"/>	<input type="button" value="v"/> Level1RegionalNumber
<a href="#">Max Forward UnRegistered Hops to DN</a> *	<input type="text" value="0"/>	0
<a href="#">CFA CSS Activation Policy</a> *	<input type="text" value="With Configured CSS"/>	<input type="button" value="v"/> With Configured CSS
<a href="#">Cause Code When Maximum Forward Hop Count is Triggered</a> *	<input type="text" value="Normal Unspecified"/>	<input type="button" value="v"/> Normal Unspecified

There are hidden parameters in this group. Click on Advanced button to see hidden parameters.

Continue down to **Cluster wide Parameters – Feature Path Replacement.**

**Step 6** Change the parameter **Path Replacement Enabled** to **True**.

**Step 7** Change the parameter **Path Replacement Minimum Delay Timer** to **15**. (Note 1)

**Step 8** Change the parameter **Path Replacement Maximum Delay Timer** to **20**. (Note 1)

**Clusterwide Parameters (Feature - Path Replacement)**

<a href="#">Path Replacement Enabled</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> False
<a href="#">Path Replacement on Tromboned Calls</a> *	<input type="text" value="True"/>	<input type="button" value="v"/> True
<a href="#">Start Path Replacement Minimum Delay Time</a> *	<input type="text" value="5"/>	0
<a href="#">Start Path Replacement Maximum Delay Time</a> *	<input type="text" value="10"/>	0
<a href="#">Path Replacement T1 Timer</a> *	<input type="text" value="30"/>	30
<a href="#">Path Replacement T2 Timer</a> *	<input type="text" value="15"/>	15
<a href="#">Path Replacement PINX ID</a>	<input type="text" value=""/>	
<a href="#">Path Replacement Calling Search Space</a>	<input type="text" value="City11Cluster4SubsCSS"/>	<input type="button" value="v"/>



Continue down to **Cluster wide Parameters – Feature Call back**

**Step 9** Change the parameter **Connection Response Type** to **Default to Connection Release**.

Clusterwide Parameters (Feature - Call Back)		
<a href="#">Call Back Enabled Flag</a> *	True	True
<a href="#">Call Back Notification Audio File Name</a> *	CallBack.raw	CallBack.raw
<a href="#">Connection Proposal Type</a> *	Connection Retention	Connection Retention
<a href="#">Connection Response Type</a> *	Default to Connection Release	Default to Connection Retention
<a href="#">Call Back Request Protection T1 Timer</a> *	10	10
<a href="#">Call Back Recall T3 Timer</a> *	20	20
<a href="#">Call Back Calling Search Space</a>	< None >	
<a href="#">No Path Reservation</a> *	True	True
<a href="#">Set Private Numbering Plan for Call Back</a> *	False	False
<a href="#">Set Type of Number for Call Back</a> *	Level1RegionalNumber	Level1RegionalNumber

There are hidden parameters in this group. Click on Advanced button to see hidden parameters.

**Step 10** Click 'Save'.

**Note 1.** The minimum and maximum delay timers are used to prevent the Cisco Unified Communications Manager from attempting Path Replacement before a call is answered since Route Optimisation is not permitted in the Alerting state by DPNSS. This can occur when an IPT phone originates a call to PBX extension which then instigates a blind transfer within the DPNSS network.

## Cisco Unified Communications Manager Routing Configuration

For the PBX phones to be reachable from the Cisco Unified Communications Manager their extension ranges must be routed via a Route Pattern to the gateway.

**Step 1** In Cisco Unified CM Administration, open **Call Routing** → **Route/Hunt** → **Route Pattern**.

(In CallManager 4.x open **Route Plan** → **Route/Hunt** → **Route Pattern**).

**Step 2** Click **Add New**.

**Step 3** Enter a regular expression for the **Route Pattern**.

**Step 4** Select the correct gateway and interface from the **Gateway/Route List** drop down list.

**Step 5** Change the **Call Classification** to **On Net**.



**Step 6** Check the **Allow Overlap Sending** tick box.

**Step 7** Click **Save** and acknowledge the warning regarding the authorization code by clicking **OK**.

**Route Pattern Configuration** Related Links: [Back To Find/List](#)

**Status**

**Status:** Ready

**Pattern Definition**

Route Pattern\*

Route Partition

Description

Numbering Plan

Route Filter

MLPP Precedence\*

Resource Priority Namespace Network Domain

Gateway/Route List\*  [\(Edit\)](#)

Route Option

Route this pattern

Block this pattern

Call Classification\*

Allow Device Override  Provide Outside Dial Tone  Allow Overlap Sending  Urgent Priority

Require Forced Authorization Code

Authorization Level\*

Require Client Matter Code

**Step 8** Repeat steps 1 to 7 for each range of numbers that has to be routed to the PBX(s)

Beyond the routing the extension ranges of the PBXs and possibly any breakout numbers that go via the PBX it is necessary to route certain system numbers in order for some supplementary services such as Route Optimization / Path Replacement to work. These numbers may be configured in a number of ways within the PBXs but are under generic 'system parameters' heading. See speid and sprad system parameters in the PBX Configuration section. A list of the route patterns for the test network is shown below.



## Find and List Route Patterns

### Status

**i** 11 records found

### Route Patterns (1 - 11 of 11)

Rows per Page 50

Find Route Patterns where  begins with

<input type="checkbox"/>	Pattern	Description	Partition	Route Filter	Associated Device
<input type="checkbox"/>	<a href="#">16XXXX</a>	iSDX via VG30D	<a href="#">iSDXPT</a>		<a href="#">S1/SU1/DS1-0@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">19804XX</a>	DXR ROP	<a href="#">DXRPT</a>		<a href="#">S1/SU1/DS1-1@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">19816XX</a>	iSDX ROP	<a href="#">iSDXPT</a>		<a href="#">S1/SU1/DS1-0@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">22XX</a>	Telesoft Load Generator			<a href="#">S2/DS1-1@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">12XXXX</a>	DXR via VG30D 2	<a href="#">DXRPT</a>		<a href="#">S1/SU1/DS1-1@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">24XX</a>	Telesoft Load Generator			<a href="#">S2/DS1-0@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">72[5-9]X</a>		<a href="#">City11Cluster5SubsPT</a>		<a href="#">S2/DS1-0@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">7300</a>	Voice Mail Pilot	<a href="#">VMPilotPT</a>		<a href="#">Unity SIP Trunk</a>
<input type="checkbox"/>	<a href="#">51XX</a>	DXR Extensions	<a href="#">DXRPT</a>		<a href="#">S1/SU1/DS1-1@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">6[5-6]XX</a>	iSDX Extensions	<a href="#">iSDXPT</a>		<a href="#">S1/SU1/DS1-0@GW3800-ENT11.ipcbuemea.cisco.com</a>
<input type="checkbox"/>	<a href="#">72[0-4]X</a>		<a href="#">City11Cluster5SubsPT</a>		<a href="#">S2/DS1-1@GW3800-ENT11.ipcbuemea.cisco.com</a>



## Configuring the Cisco 3845 IOS gateway

The IOS router that connects to the Cisco VG30D requires a minimal configuration in order to connect to the Communications Manager cluster. A typical configuration is shown below.

```
GW3800-ENT11>en
Password:
GW3800-ENT11#sh run brief
Building configuration...

Current configuration : 5473 bytes
!
! Last configuration change at 14:20:43 UTC Tue Apr 27 2010
! NVRAM config last updated at 16:57:38 UTC Fri Mar 12 2010
!
version 12.4
service timestamps debug datetime msec
service timestamps log datetime msec
no service password-encryption
!
hostname GW3800-ENT11
!
boot-start-marker
boot system flash:c3845-adventerprisek9_ivs-mz.124-22.YB2.bin
boot-end-marker
!
card type e1 1
logging message-counter syslog
enable password cisco
!
no aaa new-model
network-clock-participate slot 1
!
dot11 syslog
ip source-route
ip cef
!
!
ip domain name ipcbuemea.cisco.com
ip host E11C4P 10.131.11.2
ip host E11C4S1 10.131.11.3
!
multilink bundle-name authenticated
!
!
isdn switch-type primary-qsig
!
voice-card 0
 dspfarm
!
voice-card 1
 dspfarm
!
!
!
crypto pki trustpoint TP-self-signed-2799516615
 enrollment selfsigned
```



```
subject-name cn=IOS-Self-Signed-Certificate-2799516615
revocation-check none
rsakeypair TP-self-signed-2799516615
!
!
crypto pki certificate chain TP-self-signed-2799516615
certificate self-signed 01
!
!
username ciscosdm privilege 15 secret 5 $1$7pp9$w//fEDKI7qZUCJh4DpoH.0
archive
  log config
  hidekeys
!
!
controller E1 1/1/0
  pri-group timeslots 1-31 service mgcp
!
controller E1 1/1/1
  pri-group timeslots 1-31 service mgcp
!
!
interface GigabitEthernet0/0
  ip address 10.120.11.60 255.255.255.0
  duplex full
  speed 100
  media-type rj45
!
interface GigabitEthernet0/1
  no ip address
  duplex full
  speed 100
  media-type rj45
!
interface Serial1/1/0:15
  no ip address
  encapsulation hdlc
  isdn switch-type primary-qsig
  isdn incoming-voice voice
  isdn bind-13 ccm-manager
  isdn bchan-number-order ascending
  no cdp enable
!
interface Serial1/1/1:15
  no ip address
  encapsulation hdlc
  isdn switch-type primary-qsig
  isdn incoming-voice voice
  isdn bind-13 ccm-manager
  no cdp enable
!
!
ip forward-protocol nd
ip route 0.0.0.0 0.0.0.0 10.120.11.1
ip http server
ip http authentication local
ip http secure-server
!
!
```



```
control-plane
!
!
voice-port 1/1/0:15
  echo-cancel coverage 32
  cptone GB
!
voice-port 1/1/1:15
  echo-cancel coverage 32
  cptone GB
!
!
ccm-manager redundant-host e11c4p.ipcbuemea.cisco.com
ccm-manager mgcp
ccm-manager fax protocol cisco
ccm-manager music-on-hold
ccm-manager config server e11c4p.ipcbuemea.cisco.com
ccm-manager config
!
mgcp
mgcp call-agent e11c4s1.ipcbuemea.cisco.com 2427 service-type mgcp version 0.1
mgcp dtmf-relay voip codec all mode nte-ca
mgcp rtp unreachable timeout 1000 action notify
mgcp modem passthrough voip mode nse
mgcp package-capability rtp-package
mgcp package-capability sst-package
mgcp package-capability pre-package
mgcp package-capability srtp-package
no mgcp package-capability res-package
no mgcp package-capability fxr-package
no mgcp timer receive-rtcp
mgcp sdp simple
mgcp fax t38 ecm
mgcp rtp payload-type g726r16 static
mgcp crypto rfc-preferred
!
mgcp profile default
!
!
!
gatekeeper
  shutdown
!
!
line con 0
line aux 0
line vty 0 4
  login local
  transport input telnet
!
exception data-corruption buffer truncate
scheduler allocate 20000 1000
ntp peer 10.100.100.2 source GigabitEthernet0/0
end

GW3800-ENT11#
```





## Cisco VG30D Gateway Configuration

This section assumes that the initial installation and configuration of the VG30D have been completed. If this not the case please refer to the Cisco VG30D quick start guide.

<http://www.cisco.com/en/US/docs/routers/access/vg30d/vg30dquickstart/vg30dquickstart.html> Configuration of the Cisco VG30D is via its web management interface.

**Step 1.** Browse to the Cisco VG30D and log in as the ‘Advanced’ user. (Default password ‘Advanced’).

**Step 2.** Open the Cisco UCM application page from the drop down menus. **Configuration** → **Applications** → **Cisco UCM**.

Connected to : (VG-30D-DXR) 10.120.11.81  
User Mode : Advanced

Configuration | Administration | Diagnostics | Help | Logout

Gateway  
Applications  
DPNSS Basic  
DPNSS Advanced  
DPNSS Services  
Q.931 Basic  
Q.931 Advanced  
Q.931 Services  
Inter-Working

Cisco UCM  
QSIG  
VoIP  
ISDN  
Q.931  
DPNSS  
Avaya  
Nortel  
PBX

Diagnostic Overview

Go to go to the Cisco Systems Inc. Web Site.

	VG30D
	07:27:40 15/09/2010
Ohm):	Port Operational - Clock Source
Ohm):	Port Operational

Refresh

**Step 3.** Select the appropriate **User** or **Network** end to match the router interface configuration. (It is recommended although not essential that the router is configured as the **User** end)

**Step 4.** On the Cisco Unified Communications Manager configuration page click the appropriate radio buttons which represent the configuration of the attached DPNSS PBX. See the PBX configuration section for details of how to obtain the A/B X/Y configuration of the trunk.

**Step 5.** If the Cisco Unified Communications Manager version is greater than 4.1 keep the default **MGCP** , **QSIG** and **Overlap signaling** settings for maximum service compatibility.

**Step 6.** Select the appropriate **PCM clock** source. Note the link should preferably be clocked from the end that is synchronized to a public network. Select **Port 2** if the link is to be clocked from the DPNSS PBX or **Port 1** if it is to be clocked from the router.



**Step 7.** Click the 'Submit' button . The Cisco VG30D will go offline for approximately one minute while it sets all operational parameters within the unit.

## Cisco Unified Communications Manager Configuration

The values displayed when this page opens do not represent the current gateway configuration. When this form is submitted, all protocol related configuration items are set to the value most appropriate for the application as defined on this page. Gateway IP address, SNMP trap configuration and Access Control settings are unaffected by this action.

The configuration of the gateway may take up to one minute to complete during which time the gateway is off-line.

The attached router is configured as	<input type="radio"/> Network <input checked="" type="radio"/> User
The attached DPNSS Network/PBX is configured as	<input type="radio"/> A end <input checked="" type="radio"/> B end
The attached DPNSS Network/PBX is configured as	<input type="radio"/> X end <input checked="" type="radio"/> Y end
Call manager connects to the router using	MGCP <input type="button" value="v"/>
The router connects to this gateway using	QSIG <input type="button" value="v"/>
Call manager version is 4.1 or higher?	<input checked="" type="checkbox"/>
Call manager accepts overlap signalling?	<input checked="" type="checkbox"/>
Perform diversions on behalf of call manager?	<input type="button" value="v"/>
Proxy Diversion digits (max. len. 32)	<input type="text"/>
Operator Recall Timeout (0 = disabled, or min. 5 to max. 30 seconds)	<input type="text"/>
Message waiting service (for CUCM versions < 4.1)	<input type="button" value="v"/>
CUCM Message waiting ON number (max. len. 15)	<input type="text"/>
CUCM Message waiting OFF number (max. len. 15)	<input type="text"/>
The gateway should synchronize its PCM clocks to	<input type="radio"/> Port 1 <input checked="" type="radio"/> Port 2

|



## Voice Mail and Message Waiting

There are many possible scenarios for voice mail and message waiting implementation but they fall broadly into three categories.

- A network where a new IP based VM system such as Cisco Unity Connection is being installed along side Cisco Unified Communications Manager and existing DPNSS extensions users will be integrated.
- A DPNSS network with an existing third party or integrated VM system which will support IPT users on the Cisco Unified Communications Manager.
- A hybrid where existing DPNSS users remain on a legacy VM system and IPT users will use a new IP based VM.

Only the first two are discussed here since there are no interworking issues to resolve in the third case. The first case describes the test network Cisco Unity Connection integration and the second gives generic rules for using an existing legacy PBX hosted VM system.

### Cisco Unity Connection

During the testing a Cisco Unity Connection system was integrated into the Cisco Unified Communications Manager 7.1.3 and 8.0.2 clusters in order to test voice mail and message waiting indication (MWI). The integration to the 7.1.3 cluster used SCCP and was configured as per the instructions here. [SCCP Integration Guide](#). The integration with the Cisco Unified Communications Manager 8.0.2 cluster was via a SIP trunk and is described here. [SIP Integration Guide](#). The two methods were implemented in order to ascertain if there was any difference in operation or any Cisco VG30D configuration changes necessary between the two. No operational differences were observed and so the either method may be used.

Although the Cisco Unity Connection system was not integrated with any of the other clusters during this testing it has been used in earlier lab testing and is known to have been deployed successfully in the field.

The configuration of the Cisco VG30D will vary depending on the PBX(s) usage of NSI strings. iSDX's can use manufacturer specific NSI strings or DPNSS Callback Messaging supplementary service to turn the message waiting indicators on and off. Past convention has been for voice mail systems to use NSI while other messaging systems would use callback messaging. The Cisco VG30D can be configured to insert the default iSDX / DXR NSI strings or allow the user to define a custom NSI string.

When the Cisco VG30D has been configured using the Cisco UCM Application page the MWI settings on the **Configuration** → **Interworking** page will be set to their defaults. That is the Cisco VG30D will send an iSDX / DXR NSI string and a Callback Messaging supplementary service string. This is in many cases satisfactory however where this is not sufficient the **Message Waiting NSI option** must be changed to **RAW** and the **Message Waiting ON/OFF NSI strings** must be defined by the user. The most common reasons for the default not to work are the following.

When setup using the guidelines above neither the Cisco Unity Connection nor the Cisco Unified Communications Manager will provide a calling party number to be inserted in the outgoing QSIG Setup message sent to the Cisco VG30D when activating or deactivating message waiting indication. In the absence of CLI in the incoming DPNSS ISRM the call will be cleared by the PBX and the MWI activation / deactivation will fail. By using the Cisco VG30Ds' ability to define custom NSI strings a CLI may be inserted along with the NSI string. This was the configuration successfully used in the test bed and is illustrated below where the Cisco Unity Connection VM pilot number has (7300) has been inserted as the CLI (**\*50\*7300#**) along with the iSDX NSI MWI strings (**\*58\*AN\*1#** and **\*58\*AN\*0#**).

## Interworking Configuration

Call Completion enabled	<input checked="" type="checkbox"/>
Message Waiting option	QSIG <input type="button" value="v"/>
Facility Element coding	ISO <input type="button" value="v"/>
Message Waiting NSI option	Raw <input type="button" value="v"/>
Message Waiting ON NSI string (max. len. 30)	*50*7300#*58*AN*1#
Message Waiting ON call centre number (max. len. 10)	
Message Waiting OFF NSI string (max. len. 30)	*50*7300#*58*AN*0#
Message Waiting OFF call centre number (max. len. 10)	
CUCM Message Waiting ON number (max. len. 15)	1900
CUCM Message Waiting OFF number (max. len. 15)	1901
DPNSS Message Waiting Call Back Messaging string	Standard *171B#/*172B# <input type="button" value="v"/>

In some existing installations the PBX MWI default settings may have been changed, commonly because a third party VM system uses its own NSI. It is then necessary to ascertain the MWI sequence in use and mimic these in the Cisco VG30D. First it will be necessary to determine the MWI strings in use. For the iSDX, this can be achieved as follows: On the MMI terminal, run a DPNSS trace for Virtual messages on trunk in use for outbound calls from the PBX to the Cisco VG30D. (Use lmb or trmb command depending on the software revision of the PBX). From the Operator Console, send a MWI On request to one of the IPT numbers by dialing “##61<IPT Number>” Note the DPNSS sequence seen in the trace. From the Operator Console, send a MWI Off request to the same IPT number by dialing “##60<IPT Number>” and note that sequence also. Enter the sequences in the raw Message waiting ON / OFF strings of the Cisco VG30D Interworking configuration.

In some cases, the COS/TAC will prevent DPNSS devices from activating MWI on PBX phones – in these cases, appending a valid COS string to the MWI message (\*18\* etc.) may also be required.

### Multiple DPNSS diversions

When multiple diversions occur within the DPNSS network before the call is finally directed to the Cisco Unity VM the call can be presented to as a direct call to the pilot number. i.e. DPNSS ext. B forwards calls to DPNSS ext. C which in turn is forwarded to Cisco Unity voice mail. The correct operation is for a user ‘A’ that calls ext. ‘B’ to reach ‘B’s mailbox but instead the call is presented as a direct call from ‘A’ to the Cisco Unity VM. In Cisco Unified Communications Manager **6.x and later** the following change may be made in order to rectify this.

**Step 1** In Cisco Unified CallManager Administration, open **System** → **Service Parameters**.



**Step 2** Select the publisher server from the list of active servers.

**Step 3** Select **Cisco CallManager** from the drop down Service list.

**Step 4** Click on the ‘Advanced’ button just under the page title.

Scroll down to **Cluster wide Parameters – Feature Forward**

**Step 5** Change the parameter **Copy QSIG DiversionReason to OriginalDiversionReason** to **True**.

**Step 6** Click ‘Save’.

Clusterwide Parameters (Feature - Forward)		
<a href="#">Forward Maximum Hop Count</a> *	12	12
<a href="#">Forward No Answer Timer</a> *	12	12
<a href="#">Max Forward Hops to DN</a> *	12	12
<a href="#">Retain Forward Information</a> *	True	False
<a href="#">Forward By Reroute Enabled</a> *	True	False
<a href="#">Transform Forward by Reroute Destination</a> *	True	True
<a href="#">Include Voice Mailbox Address in QSIG Call Diversion APDUs</a> *	False	False
<a href="#">Copy QSIG DivertingNr to Redirecting Number</a> *	False	False
<a href="#">Copy QSIG DiversionReason to OriginalDiversionReason</a> *	True	False
<a href="#">Always Forward Switch Voice Mail Calls</a> *	True	True
<a href="#">Forward By Reroute T1 Timer</a> *	10	10
<a href="#">Transform Inbound QSIG originalCalledNr</a> *	False	False
<a href="#">Include Original Called Info for Q.SIG Call Diversions</a> *	Only after the first diversion	Only after the first diversion
<a href="#">Set Private Numbering Plan for Call Forward</a> *	False	False
<a href="#">Set Type of Number for Call Forward</a> *	Level1RegionalNumber	Level1RegionalNumber
<a href="#">Max Forward UnRegistered Hops to DN</a> *	0	0
<a href="#">CFA CSS Activation Policy</a> *	With Configured CSS	With Configured CSS
<a href="#">Cause Code When Maximum Forward Hop Count is Triggered</a> *	Normal Unspecified	Normal Unspecified

## DPNSS hosted Voice Mail

If Cisco Unified Communications Manager IPT phones are to be integrated into a DPNSS hosted voice mail system, the iSDX / DXR must use its default NSI strings or Callback Messaging within the DPNSS network to facilitate the correct operation of message waiting to the IPT



phones. This is due to a limitation in the Cisco VG30D whereby it can only accept Callback Messaging or known NSI strings. It cannot accept custom NSI strings from the DPNSS network.

Test from the operator console using the same method as used above to ascertain the NSI strings and verify that the IPT phone correctly indicates message waiting (e.g. lights lamp or stutter dial tone etc.)

Ports connected to the voicemail platform may be required to be moved to a different TAC, check site documentation for details.

## Acronyms

Acronym	Definition
DPNSS	Digital Private Network Signaling System as detailed in BTNR 188 and 189
NSI	Non-Specified Information – vendor specific free-form PBX-to-PBX messaging
IPT	IP Telephony
CUCM	Cisco Unified Communications Manager
Q.931	ITU ISDN protocol at level 3
QSIG	ITU ISDN protocol enhancement to Q.931 carrying additional features
MGCP	Media Gateway Control Protocol
PBX	Private Branch Exchange
MMI	Man Machine Interface – specifically on iSDX/Realitis, a VT100 style console
COS	Class Of Service – on an iSDX, the ability to activate features on a particular line
CLI	Calling Line Identity
TAC	Trunk Access Class – the ability for an extension to use a specific trunk
VM	Voice Mail

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