Overview

Before Beginning an Installation

Ensure you have the information described in this section to hand, and are aware of the capability of the hardware modules available.

Information from BT Wholesale

- Telephone Number for the Contract
- Domain Name to use
- SRV address.
- Number of Channels
- List of other Numbers

Customer Specific Information

- External IP address. This needs to be registered with BT.
- This must match the Firewall IP address used by the UCP and voice modules.

E-LG Hardware And Software

- BT SRV Support introduced in early 5.0 software, use R5.0.27. Unified 6 software is recommended for SRV support.
- Use RFC 2833 for DTMF negotiation.
- Ensure you are running the latest version of software on all VOI modules.
- Very Rarely, some inbound call paths through BT will require in-band DTMF support. You should consider using VOIU, VVOIMT, VOIM and VCIM over VOIU(SW) and vVOIM trunks.

Steps Required

Below is an outline of the steps required to configure BT SIP with the Unified platform. Each headline is expanded further in a later section.

- Configure External IP Address on the UCP
- Lines and Line Group Programming
- Configure the BT SBC Information
- Configure the Telephone Numbers
- Configure Outbound Number Presentation
- Configure Inbound Routing

Configure The External IP Address that will be seen by BT

Configuring the UCP with the external device is the same regardless of carrier. You will use the Firewall IP Address (the external IP address of a site) to present a single IP address to a carrier, regardless of the number of external VOI modules in use.

In System IP Plan:

Dip switch 4 status : OFF

Check All	Attribute	Value	
	UCP DHCP	OFF	
	UCP IP Address	10.101.16.10	
	UCP MAC Address	000C2950487E	
	UCP Subnet Mask	255.255.255.0	
	Router IP Address	10.101.16.1	
☐	System IP Range	10.101.16.15	- 10.101.16.50
☐	System Subnet Mask	255.255.255.0	
☐	Automatic IP Assign	ON	
☐	Second System IP Address	0.0.0.0	
☐	Second System Net Mask	255.255.0.0	
☐	Firewall IP Address		
☐	DDNS Usage of Firewall	ON 10 (min, 1-127)	
☐	Domain Name of Firewall		
☐	First MAC Range	000000000000	- 000000000000
☐	Second MAC Range	000000000000	- 000000000000
☐	DNS IP Address	10.101.16.1	
☐	System IPv6 Usage	No	
☐	System IPv6 Address	::	
☐	System IPv6 Router	::	
☐	System IPv6 Net Prefix	64	

SLAAC Info : IP(dd6c::9937:b124:0:20c:29ff:fe50:487e/64), Router(fe80::9683:c4ff:fe0d:5933)

If you have a static IP address. Set the Firewall IP Address to the IP address. Changing IP entries in System IP Plan, may require a reboot. You should also set the DNS server here, to allow NTP, On-line licensed modules (Unified 4.0+), or On-line Licensing (Unified 6.0+).

You need to also set the IP address in the Board Base Attributes for external VOI modules (for this purpose, built in vVOIM counts as an external VOI module).

Device/Gateway Sequence(Slot) Range 2402

Order	Check All	Attribute	Value	Range
1	☐	IP Address	10.101.16.15	
2	☐	IPv6 Address		
3	☐	Router IP Address	10.101.16.1	IP Address
4	☐	Device Codec Type	System Codec	
5	☐	Firewall IP Address	1.1.1.1	IP Address
6	☐	RTP Packet Relay Firewall IP Address		IP Address

UDP Port 5060 Configuration When UCP is behind NAT.

If the UCP is behind a NAT Firewall, we need to consider how the UCP will refresh the path through the Firewall.

Normally one of two choices is used:

1. Use Options Keep Alive to send Options message to BT, to periodically refresh the binding through the NAT firewall.
   a. In SIP CO Attributes (133), enable option 18 Options Usage in (Keep Alive).

b. In SIP Common Attributes (210) set options 6, Check Message Send Timer. You should ensure that the value is less than the UDP Connection timer on the Firewall for port 5060.
2. Set a Port Forward (DNAT) to forward traffic destined to the External IP address port 5060 to port 5060 of the UCP on its local IP address.
   a. On the firewall, limit the source IP address for UDP 5060 forward rules to only allow external IP addresses, such as the BT IP addresses.
   b. Consider using an Allow List ACL on UCP port 5060 to limit to the known source of SIP Trunks and or Extensions.

Determining BT IP Addresses for Use with Firewall or ACL Rule

BT will supply a DNS address on which a DNS SRV request should be used to find SIP Servers to connect to. You need to manually perform the SRV query to obtain these IP addresses for Firewall or ACL rules. You can use the nslookup tool on windows to do this.

Configure Line and Line Group Information

The VOIU Channels need to be configured for use as SIP trunks.

Virtual VOIM	113	Normal	Common	201
Virtual VOIM	114	Normal	Common	201
Virtual VOIM	115	Normal	Common	201
Virtual VOIM	116	Normal	Common	201
Virtual VOIM	117	Normal	Common	201
Virtual VOIM	118	Normal	Common	201
Virtual VOIM	119	Normal	Common	201
Virtual VOIM	120	DID	Common	1
Virtual VOIM	121	DID	Common	1
Virtual VOIM	122	DID	Common	1
Virtual VOIM	123	DID	Common	1
Virtual VOIM	124	DID	Common	1
Virtual VOIM	125	DID	Common	1
Virtual VOIM	126	DID	Common	1
Virtual VOIM	127	DID	Common	1
Virtual VOIM	128	DID	Common	1

- For BT SIP, typically the CO Type will be DID.
- Place the CO Lines in the correct Line Group.
- CO Type and Line Group are configured in CO Line Data, Common Attributes (140).
- Consider the VoIP mode:
  - In general, do not use Common if you have Private Networking. It is best to separate out your Private Network resources. Set them to H323 Trunks, or H323 Trunks and RTP Relay. The VoIP Type is set in CO Line Data VoIP
  - BT SIP Trunks must be SIP Trunks, so typically set to Common (if there is no H323), or SIP Trunk and RTP Relay. If you are using separatee H323 and RTP Relay channels, you can set to SIP Trunk Only, to stop internal from or to a Remote user from using trunk VOI resource.
- Configure the VoIP mode in CO Line Data, VoIP Attributes (142).

Configuring DDI Routing

In DID Service Attributes (145), set up your BT VOI trunks to use DDI, typically through the Flexible DDI Table.

CO Range 1-8

Order ↓a	Check All	Attribute	Value	Range
1	☐	DID Start Signal	Immediate ⌄	
2	☐	DID Conversion Type	Modify Using Flexible DID Conversion Table ⌄	
3	☐	Number of Digits Expected from DID Circuit	3	1 - 4
4	☐	DID Digit Mask	#***	Must be 4 digits (include '*' and '#') #: ignore digit, *: any kind of digit

Station Controlled Outbound Number

To allow the outbound number to be controlled from Station CLI Programming, you need to set the CLIP Table Index to "Station CLI" in CID/CPN Attributes (151).

CO Range 1-8

Order ↓a	Check All	Attribute ↓a	Value		Range
		CID Password		Go to Setting	Max 12 Characters
1	☐	COLP Table Index	N/A ⌄		
2	☐	CLIP Table Index	Station CLI ⌄		
3	☐	Type of Number for Calling Party Info	Unknown ⌄		
4	☐	Incoming Prefix Code Insertion	OFF ⌄		
5	☐	Outgoing Prefix Code Insertion	ON ⌄		

To allow flexibility od outbound CLI for extensions, such as forwarding with the original number, or presenting your mobile number, we need to send P-Assert as the identity in the SIP URL for example 441234567890. This allows us to send national format numbers in the From header.

To control this, we will use the Station CLI to control the From header, and the SIP USER INDEX to control the P-Assert header. Program CID/CPN Attributes (151) controls which Station CLI will be used for the from header, it defaults to Station CLI 1.

12	☐	Calling Party Numbering Plan	ISDN/Telephony ⌄	
13	☐	Called Party Numbering Plan	Unknown ⌄	
14	☐	Station CLI Type	Station CLI 1 ⌄	
15	☐	DID Remove Number	0	00-99

Configuring BT SIP Information

We need to configure SIP Registration the trunk phone number. Other phone numbers are also needed in program SIP User ID Attributes (211), to answer 401/407 challenges which are used by BT for transfer and other RE-INVITE scenarios.

Configuring the Unified to Use SRV Records

In program SIP Common Attributes (210), we configure the Unified product to look up SRV records.

- We must include a DNS server in this program. The IP address can be the same as the IP address in program 102.
- Under miscellaneous option, we turn on "DNS SRV Usage".

Order	Attribute	Value	Range	Remark
1	Primary DNS Address	10.101.16.1	Max 32 Characters	SYSTEM will be restarted after [SAVE]
2	Secondary DNS Address		Max 32 Characters	SYSTEM will be restarted after [SAVE]
3	Local Server UDP Port	5060	Port	SYSTEM will be restarted after [SAVE]
4	Local Server TCP Port	5060	Port	SYSTEM will be restarted after [SAVE]
5	Local Server TLS Port	5061	Port	SYSTEM will be restarted after [SAVE]
6	Check Message Send Timer	30	0 (OFF), 10-3600 sec	

	Miscellaneous Option			
1	OCS Prefix Code		Max 8 Digits	OCS only
2	SIP Pound Use	OFF ⌄		
3	BLF SYNC NOTIFY Timer	10	10-360	Delay time before sending NOTIFY(blf-sync)
4	SRTP PATH(SIPEXT)	VOIM RELAY ⌄		VOIM Relay or Direct between SIPEXT
5	DNS SRV Usage	ON ⌄		DNS SRV query

Configuring the BT SBC Information

We need to configure the UCP to talk to the BT SBC, from the information supplied by BT.

CO Range 120-128

Order	Check All	Attribute	Value	Range
1	☐	Soft Switch Type	BT DNS REDUN ⌄	
2	☐	Proxy Server Address	ipcomms-btw-modb-sipt-dynamic-coremetro	IP Address
3	☐	Use Outbound Proxy	ON ⌄	
4	☐	Connection Mode	UDP ⌄	
5	☐	Caller Name Service	Use ⌄	
6	☐	181 Being Forwarded	Unused ⌄	
7	☐	100 rel	OFF ⌄	Supported or Require Header
8	☐	Use single codec only	ON ⌄	
9	☐	Use rport method	ON ⌄	
10	☐	Domain	interopc2.domain	Domain Name or Proxy Server Address
11	☐	Invite Acceptance	From All ⌄	
12	☐	Contact Address Domain	SIP Device Addr ⌄	
13	☐	From Address Domain	Server Domain ⌄	
14	☐	Firewall IP Apply	ON ⌄	
15	☐	Diversion Recursing	Recursing ⌄	302,Blind Transfer
16	☐	VSF Answer Response	200 OK ⌄	
17	☐	RTP Diversion Method	Recursing ⌄	
18	☐	OPTIONS Usage(Keep Alive)	ON ⌄	PGM210 Check Message Send Timer
19	☐	Proxy Registration Timer	149	1-65535
20	☐	Proxy Server UDP Port	5060	Port(1-65535)
21	☐	Proxy Server TCP Port	5060	Port(1-65535)
22	☐	Proxy Server TLS Port	5061	Port(1-65535)
23	☐	Registration UID Range	1 - 3	Max 2400 Entries
24	☐	DTMF Type	2833 ⌄	

- The Proxy Server Address needs to be the DNS record to search for SRV record.
- The Domain (SIP Domain) should be set to the domain name supplied by BT. This will be different to the DNS name used in the Proxy Server.
- The Firewall IP Apply settings should be On, to avoid leaking information about the private network behind the NAT router.
- BT support NAT traversal, so in principal you should be able to connect with no forwards on a typical SME router with no outbound traffic restrictions. Either
    o Configure port forward for the firewall/NAT using the process above to limit source addresses on port 5060.
    o Enable Options Keep Alive and set the "Check Message Timer" to a value in program 210 smaller than the UDP Session Timer on the Firewall/NAT router.
- BT SBC uses Registration of the Trunk Telephone Number.
    o The BT SBC can challenge for username and password during Re-INVITES, so other DDIs should be entered in SIP USER ID Attributes (126), as "Provision".
    o Place the range containing this DDIs in "Registration UID Range.

Configuring Telephone Numbers

All numbers assigned need to be created in Program 126 – "SIP User ID Attributes".

SIP User ID Index 1

Order	Check All	Attribute	Value	Range
		CID Password	[ ] Go to Setting	
1	☐	Registration User ID	441234567890@interop	Max 64 Characters
2	☐	Authentication User ID	Userame	Max 64 Characters
3	☐	Authentication User Password	************************	Max 64 Characters
4	☐	Contact Number		Max 16 Characters
5	☐	Contact Display Name		Max 21 Characters
6	☐	Asc Station Number		
7	☐	User ID Register	Register ∨	
8	☐	Authorized Representative ID Table Index	0	0 - 2400
9	☐	User ID Usage	ON ∨	
10	☐	Ring Route Type	DID CONVERSION ∨	
11	☐	DID Conversion Type	Modify Using Flexible DID Conversion Table ∨	
12	☐	Number of Digits Expected from DID Circuit	3	2-4
13	☐	DID Digit Mask	#***	4 Digits: *,#,0-9
14	☐	SMS Received Station Number		

- The first entry should be the Telephone Number for the account, this is the telephone number that registers with BT.
- The Registration URL is the number as it will appear in the SIP header in the "To" header file for incoming calls. The for at should be number@domain. The Domain should match the domain in Program 133.
- The Authentication User ID, and User Password are the username and password supplied by BT. These are used for registration (if the entry is set to register), and in response to challenges from BT.
  - Each DDI will use the same username and password supplied by BT.
- The Ring DID Conversion, Expected Digits and DID Digit Mask should normally mirror the Line Settings for the SIP trunks the number will be delivered on in "DID Service Attributes" (145).

All other DDIs should also be configured in Program 126 – "SIP User ID Attributes", using the same template as the entry to be registered but set to "Provision".

Order	Check All	Attribute	Value	Range
		CID Password	[_____] Go to Setting	
1	☐	Registration User ID	441111111111@interopc2.do	Max 64 Characters
2	☐	Authentication User ID	EricssonUCP	Max 64 Characters
3	☐	Authentication User Password	******************************	Max 64 Characters
4	☐	Contact Number	[_____]	Max 16 Characters
5	☐	Contact Display Name	[_____]	Max 21 Characters
6	☐	Asc Station Number	[_____]	
7	☐	User ID Register	Provision ⌄	
8	☐	Authorized Representative ID Table Index	0	0 - 2400
9	☐	User ID Usage	ON ⌄	
10	☐	Ring Route Type	DID CONVERSION ⌄	
11	☐	DID Conversion Type	Modify Using Flexible DID Conversion Table ⌄	
12	☐	Number of Digits Expected from DID Circuit	3	2-4
13	☐	DID Digit Mask	#***	4 Digits: *,#,0-9
14	☐	SMS Received Station Number	[_____]	

Presenting Outbound Telephone Numbers

IN CID/CPN Attributes (151) CLID Table is set to Station CLI, and "Station CLI Type" is set to "Station CLI 1". With this setup, Station CLI 1 in Station CLI program is used to set the outbound CLI for a station. Other options such as Digit Conversion, MSN buttons can override this value.

Station Range 100-109

CID Password : [_____] Go to Setting

	Station Number	Station CLI 1 Max 12 Digits	Station CLI 2 Max 16 Digits	Station CLI 3 Max 16 Digits	Station CLI 4 Max 16 Digits	Station CLI 5 Max 16 Digits
☐	100	100				
☐	101	101				
☑	102	07123456789				
☑	103	441986303313				
☐	104	104				
☐	105	105				
☑	106	441986303312				
☑	107	441986303312				
☐	108	108				
☐	109	109				

The above will allow simple outbound calling using the number in "Station CLI 1"

Station 100-101,104-105,108-109 have not been configured and will not dial out.

Station 102 has been set to send the user's mobile number as the outbound CLI. When sending a different number like this, the number must be formatted in UK National Numbering Format (e.g. 01234567890, the leading zero is required).

Station 103 (and 106-107) are sending the user info portion of the URL from Program 126 – "SIP User ID Attributes, to send that DDI number to the remote party.

Additional Configuration in SIP CO Attributes Program 133

Follow the steps below to allow the UCP to send the original CLI on transferred and forwarded calls, and calls to twinned mobiles.

		ID Presentation Option		
		ID Usage		
1	☐	P-Asserted-ID	Use ⌄	
2	☐	P-Preferred-ID Usage	Unused ⌄	
3	☐	Remote-Party-ID	Unused ⌄	
4	☐	Privacy(CLIR) Presentation	Anonymous Name & Anonymous Number ⌄	

		SIP UID Assignment		
1	☐	SIP User ID Fixed Table Index	1	
2	☐	SIP User ID SELECTION	SIP USER TABLE INDEX ⌄	Refer PGM111

SIP User ID Fixed Table Index refers to the index number in "SIP User ID Attributes" Program 126. This should be set to the BT Telephone Number, the 1st entry set to "Register" not "Provision".

The different sections of ID Presentation Options use the above configuration to send the outgoing number and the support headers used by BT in the different scenarios.

For the flexible CLI scenario, The SIP User ID Selection entry sets which SIP USER TABLE INDEX entry in Program 111 Station Common Attributes is used to set the P-Assert header.

Outgoing Calls From Extensions

		ID Individuality		
		CID Password	[____] Go to Setting	Max 12 Characters
1	☐	From ID	Extension Outgoing-CLI ⌄	
2	☐	From Display	SYS RULE ⌄	
3	☐	P-Asserted-ID	Extension SIP-User-ID-Table ⌄	
4	☐	P-Asserted-ID Display	SYS RULE ⌄	
5	☐	Contact ID	Extension SIP-User-ID-Table ⌄	
6	☐	Remote-Party-ID	Extension SIP-User-ID-Table ⌄	
7	☐	Diversion	Unused ⌄	

The above configures the SIP trunks to use "Station CLI 1" for the From, Contact and P-Assert Headers. The default value is the station number, so if you fail to set Station CLI 1, outbound calls may fail.

If you set Station CLI 1 to anything other than the User Info of a URI in Program 126, you must set the SIP USER ID INDEX in Program 111 Station Common Attributes to an Index in Program 126, other than the Index that Registers. This sets the P-Assert ID, to tell BT who is actually making the call.

Station Data ⌄		31	☐	Prepaid Call	OFF ⌄			
		32	☐	Prepaid Money (0 - 999999) & Used Prepaid Money	0	0		
Station Type(110)		33	☐	SIP USER TABLE INDEX	2		0-2400	
Common Attributes(111)		34	☐	SIP USER TABLE INDEX 2	0		0-2400	
Terminal Attributes(112)		35	☐	SIP USER TABLE INDEX 3	0		0-2400	
Station Data ⌄		31	☐	Prepaid Call	OFF ⌄			
		32	☐	Prepaid Money (0 - 999999) & Used Prepaid Money	0	0		
Station Type(110)		33	☐	SIP USER TABLE INDEX	2		0-2400	
Common Attributes(111)		34	☐	SIP USER TABLE INDEX 2	0		0-2400	
Terminal Attributes(112)		35	☐	SIP USER TABLE INDEX 3	0		0-2400	

Call Forward Settings (Forwarding Without a Station)

		Offnet Call Route ID Transit		
		CO to Offnet Direct Call Route		
1	☐	From/Contact ID	Fixed Table ⌄	
2	☐	From Display	SYS RULE ⌄	
3	☐	P-Asserted-ID	Fixed Table ⌄	
4	☐	P-Asserted-ID Display	SYS RULE ⌄	
5	☐	Remote-Party-ID	Original CLI ⌄	
6	☐	Diversion	Unused ⌄	

The above will send calls that Forward from a system object (for example, VSF or Station Group) using the BT Telephone Number (the first registered number in Program 126), as the outgoing number.

Following a Station Call Forward, Blind Transfer from an Extension

		Offnet Call Forward by Station		
1	☐	From/Contact ID	Original CLI ⌄	
2	☐	From Display	SYS RULE ⌄	
3	☐	P-Asserted-ID	Extension ⌄	
4	☐	P-Asserted-ID Display	SYS RULE ⌄	
5	☐	Remote-Party-ID	Extension ⌄	
6	☐	Diversion	Extension ⌄	

Inbound Routing

Use the Flexible DDI to route calls, as configured for the User IDs in program 126, MSN and System Routing, and SIP Call Groups can be used to override Flexible DDI Routing.

Following the steps above the majority of DDIs will route through the Flexible DDI table, using the last 3 digits of the DDI.