Dinstar Session Border Controller

Training Session

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Agenda

1.
Introduction of
SBC

2.
How to Configuration
SBC

3.
Advance features

4.
Troubleshooting

5.
FAQ

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Introduction
of
SBC

Session Border Controller

Overview

Dinstar SBC provides rich SIP-based services such as safe network access, robust security, system interconnectivity, flexible session routing & policy management, QoS, media transcoding and media processing for small-and-medium telecommunication operators. With distributed multi-core processor, rear panel for non-blocking gigabit switching data as well as embedded Linux operating system, the session border controller delivers high capability while achieves low power dissipation.

It is able to process up to 50,000 concurrent SIP sessions and transcode 5,000 concurrent calls. Meanwhile, it supports dual control boards and dual hot-swappable power supplies, and allows encrypted sessions via TLS and SRTP. Apart form traditional codecs like G.729, G.723, G.711 and G.726, SBC3000 also supports the transcoding of iLBC, AMR and OPUS.

Session Border Controller

Security

SIP Firewall

SIP TLS/SRTP

Anti DDoS Attack

Access Control

Topology Hiding

Endpoint Authentication

SIP Intrusion Prevention

SIP Malformed Packet
Protection

Interoperability

SIP Header Manipulation

SIP Message Manipulation

B2BUA

IPv4 – IPv6

Transcoding

Session Control

Traffic Control

Registration / Call Rate

Limiting

Flexible Routing

QoS

Resiliency

High Availability

SIP Trunk Load Balancing

Alternative Routing

WebRTC

Session Border Controller

	SMB SBC	Enterprise SBC	Carrier SBC	Software SBC
	SBC300	**SBC1000**	**SBC3000**	**SBC8000**
SIP Sessions	5 to 50	50 to 500	500 to 5000	50,000
Transcoding Calls	50	200	1500	5000
Calls per Second	25/s	25/s	200/s	800/s
SIP Registrations	1,000	5,000	20,000	100,000
SIP Registrations per second	20/s	25/s	200/s	800/s

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How to
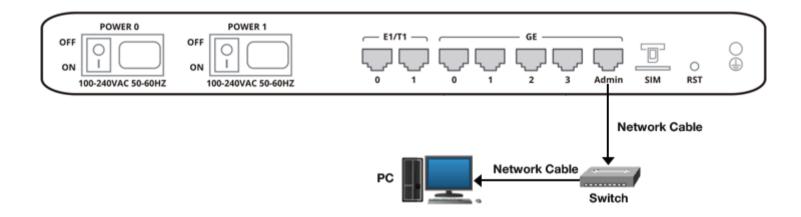Configuration
SBC

How to Configuration

Configuration the network

The SBC Admin port use static IP 192.168.11.1/24 as default.

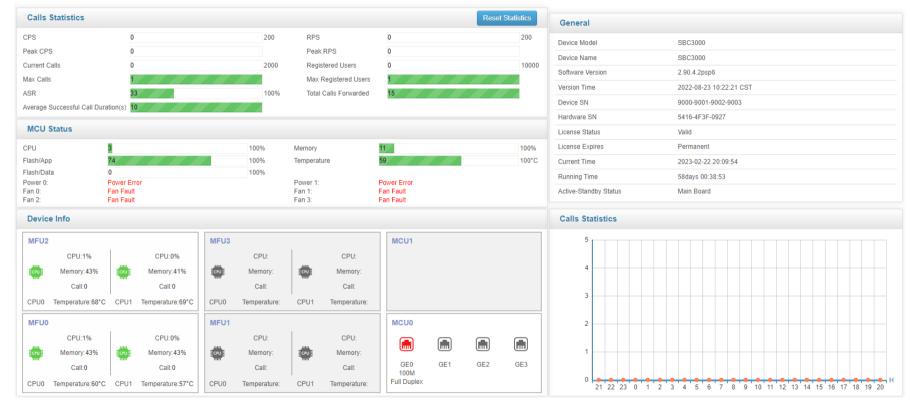Before access the SBC, should add IP 192.168.11.X in your PC, like 192.168.11.20.

Then access the GUI of SBC through web browser.

Note:

1. The GUI access use HTTPS
2. SBC3000 used GE1

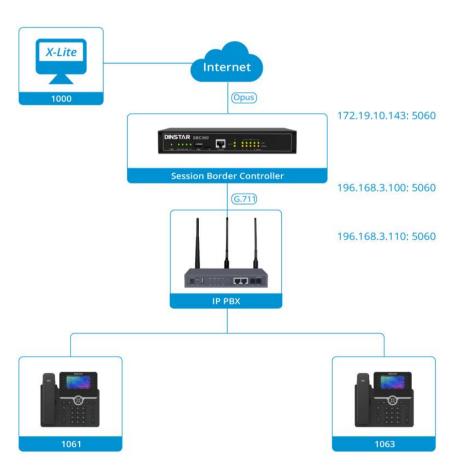# How to Configuration

Configuration the network

How to Configuration

- Draw the network logic graph

- Configuration the network

- Configuration the SIP trunk

- Configuration the call route

- Advance configuration (Options)

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How to Configuration

Configuration the network

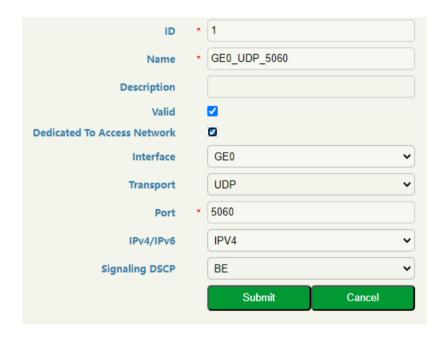| Network							
Name	Service or Management Port	MTU	Mac	IPV4 Address	Subnet Mask	IPV4 Gateway	IPV4 DNS
GE0	Service Port	1500	f8:bb:00:80:00:80	172.19.10.143	255.255.0.0	172.19.1.1	8.8.8.8/114.114.114.114
GE1	Service Port	1500	f8:bb:00:80:00:81	192.168.3.100	255.255.255.0	192.168.3.1	/

Open Page System>>>Network, set the network as graph, reboot to active.

GE0 for Internet

GE1 for Internal

Note:

If the SBC Ethernet port does not enough, you can use the VLAN and additional switch to extend it.

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How to Configuration

Configuration the TransPort Endpoint

ID	*	1
Name	*	GE0_UDP_5060
Description		
Valid		☑
Dedicated To Access Network		☑
Interface		GE0
Transport		UDP
Port	*	5060
IPv4/IPv6		IPV4
Signaling DSCP		BE

Submit   Cancel

Open Page System>>>TransPort Endpoint, add new rule, this one for monitor the Interface GE0 and SIP port 5060.
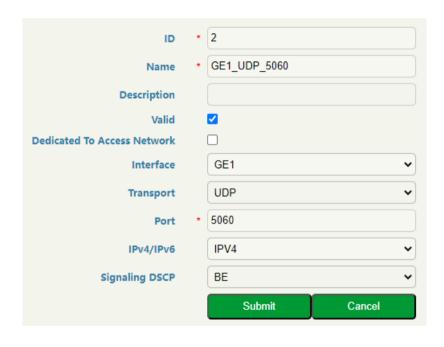Default we use UDP, but can support to TCP or TLS.

Note:
If it will use for outside register, should enable the option "Dedicated To Access Network"

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How to Configuration

Configuration the TransPort Endpoint

ID	*	2
Name	*	GE1_UDP_5060
Description		
Valid		☑
Dedicated To Access Network		☐
Interface		GE1
Transport		UDP
Port	*	5060
IPv4/IPv6		IPV4
Signaling DSCP		BE

Submit   **Cancel**

Open Page System>>>TransPort Endpoint, add new rule, this one for monitor the Interface GE1 and SIP port 5060.
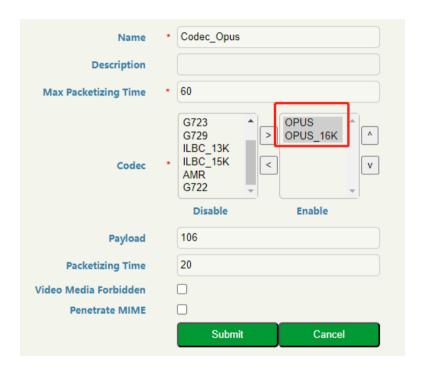Default we use UDP, but can support to TCP or TLS.

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How to Configuration

Configuration the TransPort Endpoint

TransPort Endpoint

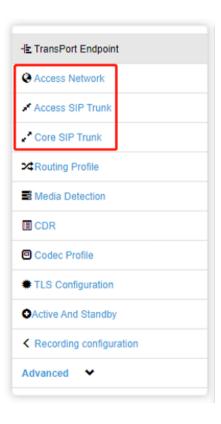| ID	Name	Description	Interface	Port	IPv4/IPv6	Transport	Dedicated To Access Network
1	GE0_UDP_5060		GE0	5060	ip4	udp	true
2	GE1_UDP_5060		GE1	5060	ip4	udp	false

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How to Configuration

Open Page System>>>Code Profile, add a new rule.

This one for make are Codec profile, it included the OPUS only.

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How to Configuration

-ᴵᴱ TransPort Endpoint
🌐 Access Network
↗ Access SIP Trunk
↗ Core SIP Trunk
⤬ Routing Profile
▤ Media Detection
▤ CDR
▣ Codec Profile
✳ TLS Configuration
⊕ Active And Standby
‹ Recording configuration
Advanced ⌄

The SBC have 3 types Trunks/Network.
Interface for outside:
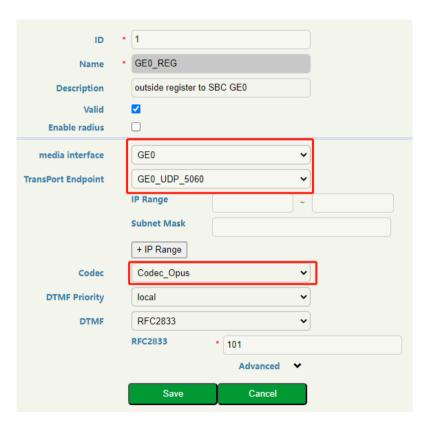Access Network, this one for outside register to SBC.
Access SIP Trunk, this one normal Trunk between SBC and
Access Network.

Interface for internal.
Core SIP Trunk, this one is core Trunk between SBC and Core
Network.

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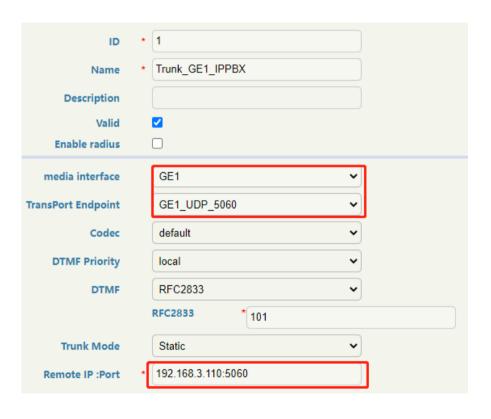# How to Configuration

Configuration the SIP Trunk

Open Page System>>>Access Network, add a new rule.
This one for make are interface for outside register to SBC, like Xlite/IPPhone.
For the Xlite/IPPhone, the SIP server IP is SBC's IP of GE0
And this trunk will use OPUS only.

How to Configuration

ID	* 1
Name	* Trunk_GE1_IPPBX
Description	
Valid	☑
Enable radius	☐
media interface	GE1
TransPort Endpoint	GE1_UDP_5060
Codec	default
DTMF Priority	local
DTMF	RFC2833
RFC2833	* 101
Trunk Mode	Static
Remote IP :Port	* 192.168.3.110:5060

Open Page System>>>Core SIP Trunk, add a new rule.
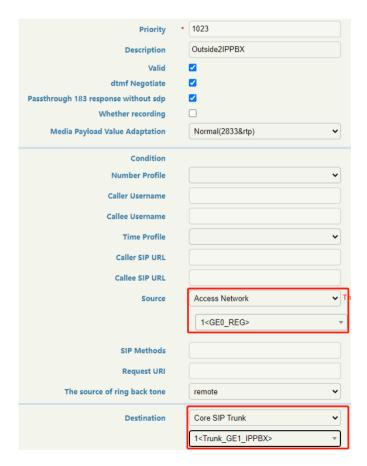This one for make are Trunk from SBC to IPPBX.
The TransPort Endpoint choose GE1_UDP_5060
The Remote IP:port input IPPBX's IP and port

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How to Configuration
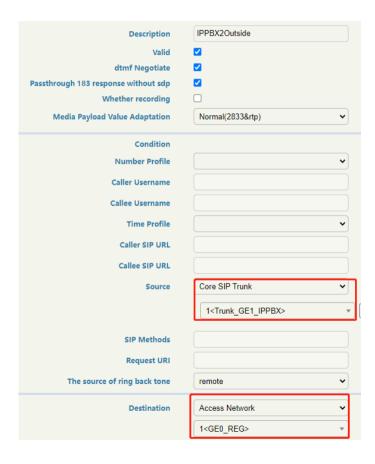
Configuration the call route

Open Page System>>>Routing Profile>>>>CallRouting, add a new rule:
The Source choose Access Network "GE0_GE"
The Destination choose Core SIP Trunk "Trunk_GE1_IPPBX"

This one for make are route from Outside to IPPBX.
All Register/call hit SBC's GE0 and port 5060 (172.19.10.143:5060) , will out from GE1(192.168.3.100:5060) and forward to IPPBX (192.168.3.110:5060)

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How to Configuration

Configuration the call route

Open Page System>>>Routing Profile>>>>CallRouting, add a new rule:
The Source choose Core SIP Trunk "Trunk_GE1_IPPBX"
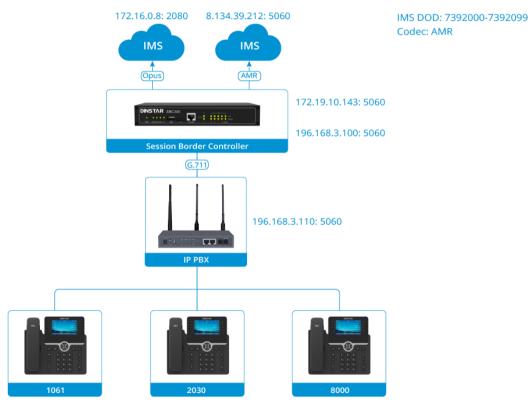The Destination choose Access Network "GE0_GE"

This one for make are route from IPPBX to Outside, like Xlite/IPPhone.
If a call from IPPBX (192.168.3.110:5060) hit SBC's GE1 and port 5060 (192.168.3.100:5060), it will out from GE0(172.19.10.143:5060) to outside.

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How to Configuration

Graph of Trunk mode

IMS DID: 7551000-7551099
IMS Register ID: 7551000
Password:12345678
Codec: Opus

172.16.0.8: 2080

8.134.39.212: 5060

IMS DOD: 7392000-7392099
Codec: AMR

IMS

IMS

Opus

AMR

172.19.10.143: 5060

196.168.3.100: 5060

Session Border Controller

G.711

196.168.3.110: 5060

IP PBX

1061

2030

8000

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How to Configuration

Configuration the network

Network

Name	Service or Management Port	MTU	Mac	IPV4 Address	Subnet Mask	IPV4 Gateway	IPV4 DNS
GE0	Service Port	1500	f8:bb:00:80:00:80	172.19.10.143	255.255.0.0	172.19.1.1	8.8.8.8/114.114.114.114
GE1	Service Port	1500	f8:bb:00:80:00:81	192.168.3.100	255.255.255.0	192.168.3.1	/

Open Page System>>>Network, set the network as graph, reboot to active.
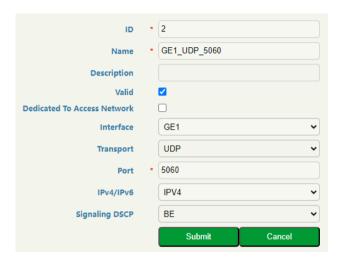
GE0 for External

GE1 for Internal

Note:

Some IMS request using VLAN, we can add the network for VLAN also.

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How to Configuration

Open Page System>>>TransPort Endpoint, add two rules:

The GE0 will used for IMS

The GE1will used for IPPBX

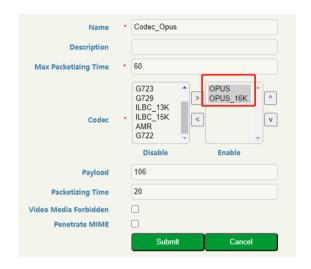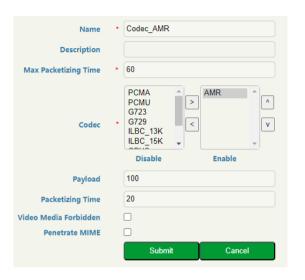Default using UDP, for some IMS, it request use TCP or TLS.

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How to Configuration

Configuration the TransPort Endpoint

TransPort Endpoint

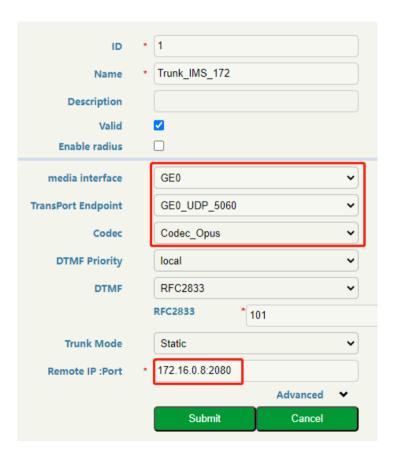| ID	Name	Description	Interface	Port	IPv4/IPv6	Transport	Dedicated To Access Network
1	GE0_UDP_5060		GE0	5060	ip4	udp	false
2	GE1_UDP_5060		GE1	5060	ip4	udp	false

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How to Configuration

Open Page System>>>Code Profile, add two new rules.

One choose OPUS, another choose AMR.

Different IMS using different codec.

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How to Configuration

Configuration the Access SIP Trunk

Open Page System>>>Access SIP Trunk, add a new turnk.
This one for make are trunk with IMS_172, the remote IP: port input the target IMS information 172.16.0.8:2080
And this trunk will use OPUS only.

How to Configuration
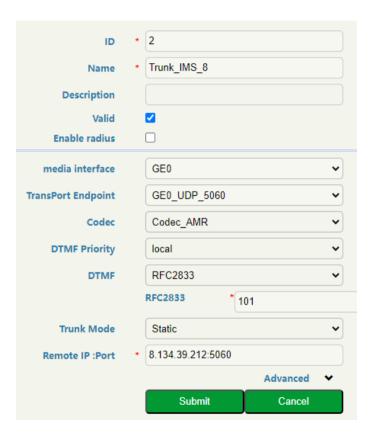
Registration	☑	
	Username *	7551000
	Authentication ID *	7551000
	Password *	•••••• 👁
	Registered Interval *	1800
	Timeout coefficient *	1

The Trunk to IMS_172 should registered with sip account 7551000
Click the advanced,
Enable the option "Registration", input the SIP account information.

Note: the Registered Interval should changed to 1800, mostly IMS had limited of this.

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How to Configuration

ID	*	2
Name	*	Trunk_IMS_8
Description		
Valid		☑
Enable radius		☐

media interface	GE0
TransPort Endpoint	GE0_UDP_5060
Codec	Codec_AMR
DTMF Priority	local
DTMF	RFC2833
RFC2833	* 101
Trunk Mode	Static
Remote IP :Port	* 8.134.39.212:5060

Advanced ⌄

Submit   **Cancel**

Open Page System>>>Access SIP Trunk, add a new turnk.
This one for make are trunk with IMS_8, the remote IP: port input the target IMS information 8.134.39.212:5060
And this trunk will use AMR only.
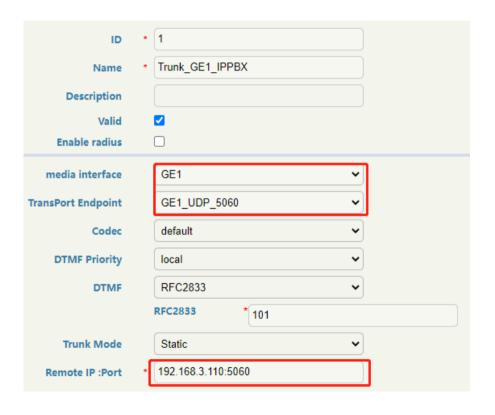
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How to Configuration

Configuration the Access SIP Trunk

Access SIP Trunk

ID	Name	Description	TransPort Endpoint	Codec	Peer IP
1	Trunk_IMS_172		GE0_UDP_5060	Codec_Opus	172.16.0.8:2080
2	Trunk_IMS_8		GE0_UDP_5060	Codec_AMR	8.134.39.212:5060

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How to Configuration

Configuration the Core SIP Trunk

ID	* 1
Name	* Trunk_GE1_IPPBX
Description	
Valid	☑
Enable radius	☐
media interface	GE1
TransPort Endpoint	GE1_UDP_5060
Codec	default
DTMF Priority	local
DTMF	RFC2833
RFC2833	* 101
Trunk Mode	Static
Remote IP :Port	* 192.168.3.110:5060

Open Page System>>>Core SIP Trunk, add a new rule.
This one for make are Trunk from SBC to IPPBX.
The TransPort Endpoint choose GE1_UDP_5060
The Remote IP:port input IPPBX's 192.168.3.110:5060

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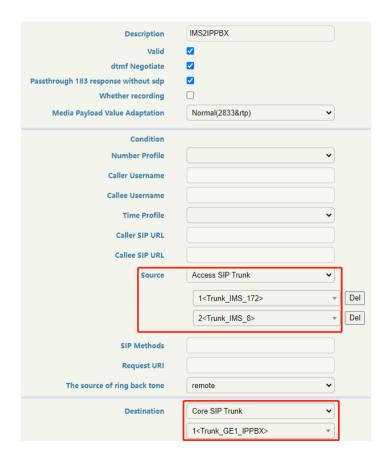
How to Configuration

Check the SIP Trunk Status

Open Page Overviewer>>>Access Trunk Status or Core Trunks Status, we can saw the trunk status is true or false.
If false, maybe the option not work or register failed or network issue.

How to Configuration

Configuration the incoming call route

Open Page System>>>Routing Profile>>>>CallRouting, add a new rule:
The Source choose Access SIP Trunk "Trunk_IMS_172" and "Trunk_IMS_8"
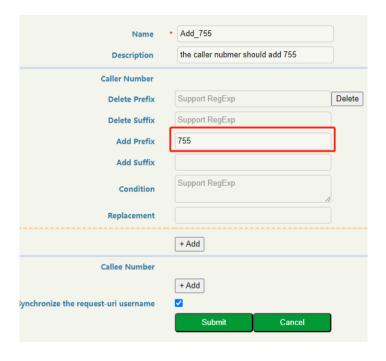The Destination choose Core SIP Trunk "Trunk_GE1_IPPBX"

This one is incoming call route: make are route from two IMSs to IPPBX.
All call hit SBC's GE0 (172.19.10.143:5060) from two IMSs , will forward to IPPBX (192.168.3.110:5060) through interface GE1 (192.168.3.100:5060)

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How to Configuration

Configuration the outgoing call route

Open Page System>>>Number Manipulation, add a new rule:

The Add Prefix input 755.

This one mean add prefix 755 to caller number.

How to Configuration

Configuration the outgoing call route

Open Page System>>>Routing Profile>>>>CallRouting, add a new rule:

The Source choose Core SIP Trunk "Trunk_GE1_IPPBX"
The Destination choose Access SIP trunk "Trunk_IMS_172"
The Caller Username input regular chars ^10\d\d$
The Number Manipulation choose "Add_755"

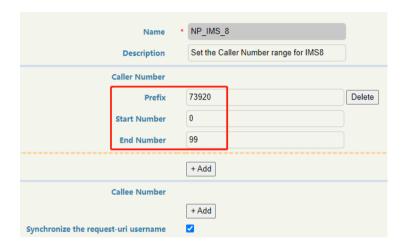The IMS_172 have DOD 7551000-7551099, the IPPBX side have extension 10xx.
So when the extension 10xx callout, it should pass the IMS_172 and the caller should using 75510xx

Note:
The Priority should input 1000, because we need this rule high priority than another.

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How to Configuration

Configuration the Number Pool

Open Page System>>>Number pool, add a new rule:
The Prefix input 73920
The Start Number set to 00
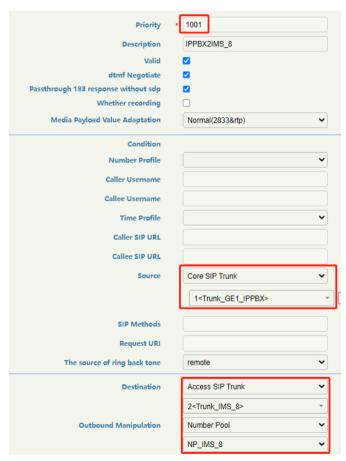The End Number set to 99

This one will set the caller number range.
If the caller number in this range already, like 7392045, pass.
If the caller number out of this range, will be replaced are random one in this range. For example, the original Caller is 7559999, will be changed to 73920xx

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How to Configuration

Configuration the outgoing call route

Open Page System>>>Routing Profile>>>>CallRouting, add a new rule:
The Source choose Core SIP Trunk "Trunk_GE1_IPPBX"
The Destination choose Access SIP trunk "Trunk_IMS_8"
The Outbound Manipulation choose Number Pool and select "NP_IMS_8".

This one mean if the IPPBX send call to IMS_8, the Caller number should in range 7392000-7392099

Note:
 the Priority should input 1001, because we need this rule low priority than before one.

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How to Configuration

Configuration the call routing

Call Routing

Priority	Description	Condition	Destination/Manipulation Rule
1000	IPPBX2IMS_172	^10\d\d$, 1<Trunk_GE1_IPPBX>	1<Trunk_IMS_172> / Add_755
1001	IPPBX2IMS_8	1<Trunk_GE1_IPPBX>	2<Trunk_IMS_8> / NP_IMS_8
1022	IMS2IPPBX	1<Trunk_IMS_172>,2<Trunk_IMS_8>	1<Trunk_GE1_IPPBX> / -

When the call from IPPBX:

If the caller number is 10xx, will out to IMS_172 and codec using OPUS, the caller replace to 7551000-7551099.

Another call to IMS_8 and codec using AMR.

    If the caller number is 7392000-7392099, pass to IMS_8 directly.

    If the Caller number is others, will be replaced are random number 7392000-7392099

When the call from IMS_172 and IMS_8, forward to IPPBX directly.
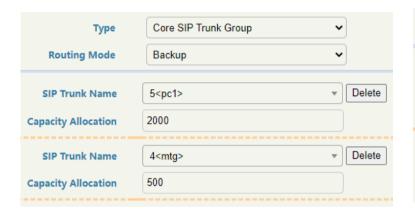
When the call form another IP, reject directly.

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Advance
Features
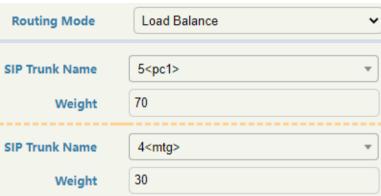
Advance Features
Trunk Group
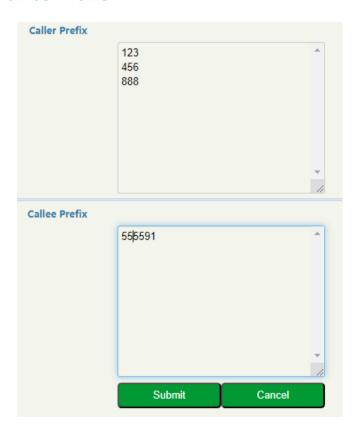
Backup mode
If the Capacity Allocation value same, all traffic to primary one, unless the trunk disconnect.
If the Capacity Allocation value different, all traffic to primary one till it full

Load Balance mode
The SBC will base weight to dispatch call to different trunk, like Trunk A received 70%, other one 30%

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Advance Features

Number Profile

The Number Profile for filter the calling/called number.
Some times, the client should limited the number in router.
You can set the prefix or whole number.
This one used in Call Route level.

Note: This one not support Regular

Advance Features

Black/While List

Whitelist Group *	2235011	
Description	2235011[41-60]	
Number	223501160	Delete
Description		
Number	22350114[1-9]	Delete
Description		
Number	22350115[0-9]	Delete
Description		

The Black/White list use for Access Trunk and Access Network level.

Limit the external register/call to SBC, decrease the heavy of SBC and IPPBX.

Note: This one not support Regular

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Advance Features

Number Pool
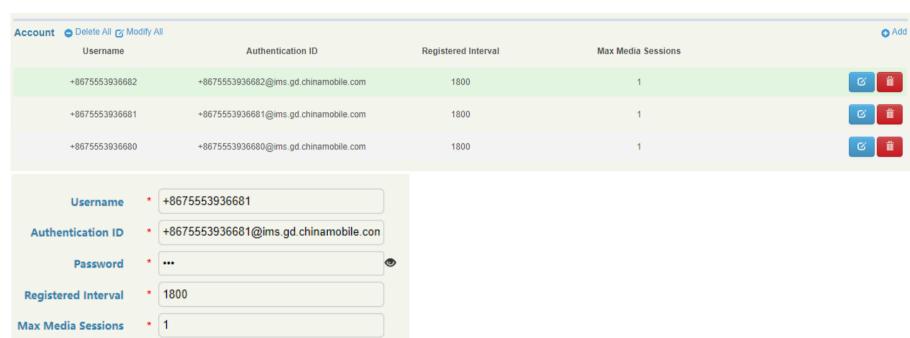
The Number Pool used for Call Route.

When SBC call out, it will replace the original number to one that in number pool.

This one used for IMS that give your one SIP account and multiple DOD.

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Advance Features

SIP account

Account	Delete All	Modify All			Add
Username	**Authentication ID**	**Registered Interval**	**Max Media Sessions**		
+8675553936682	+8675553936682@ims.gd.chinamobile.com	1800	1		
+8675553936681	+8675553936681@ims.gd.chinamobile.com	1800	1		
+8675553936680	+8675553936680@ims.gd.chinamobile.com	1800	1		

Username * +8675553936681

Authentication ID * +8675553936681@ims.gd.chinamobile.con

Password * •••

Registered Interval * 1800

Max Media Sessions * 1

The SIP account for poll register.

In the Trunk side, we can set ONE sip account only.

Some IMS give multiple SIP accounts and request register ALL.

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Advance Features

SIP Header Manipulation

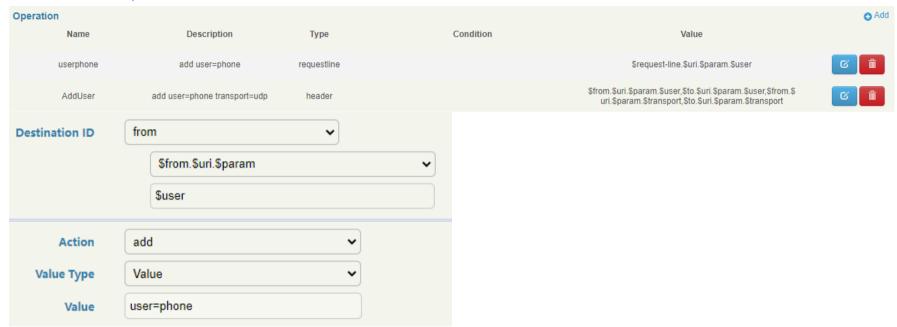| Operation					⊕ Add
Name	Description	Type	Condition	Value	
userphone	add user=phone	requestline		$request-line.$uri.$param.$user	✎ 🗑
AddUser	add user=phone transport=udp	header		$from.$uri.$param.$user,$to.$uri.$param.$user,$from.$uri.$param.$transport,$to.$uri.$param.$transport	✎ 🗑

Destination ID | from ⌄ |

| $from.$uri.$param ⌄ |

| $user |

Action | add ⌄ |

Value Type | Value ⌄ |

Value | user=phone |
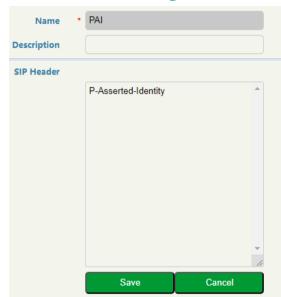
SIP Header Manipulation is the real core of SBC.

Target for change the SIP package.

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Advance Features

SIP Header Passthrough

Name	*	PAI
Description		

SIP Header
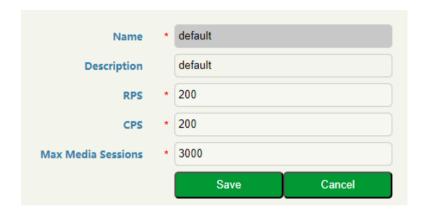
P-Asserted-Identity

[Save] [Cancel]

When the call passthrough the SBC, the INVITE is recombination.

SBC extraction the caller and callee number only.

But sometimes, we should passthrough some original field to destination, like P-Asserted-Identify.

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Advance Features

Rate Limit

We can set the rate limit for SIP Trunk.

RPS: Max SIP Register request per seconds from remote side to this Trunk.
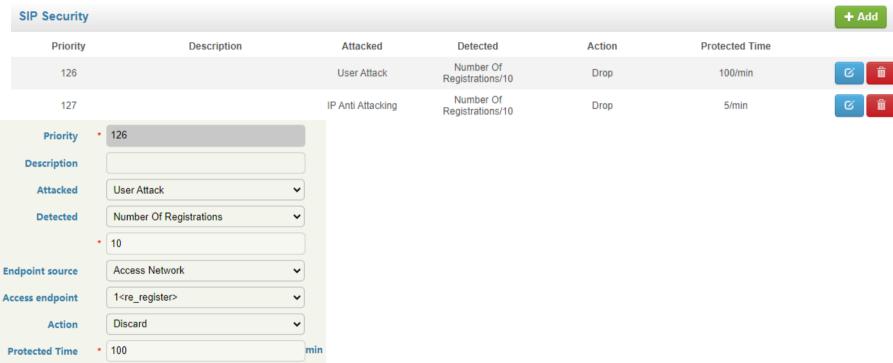
CPS: Max SIP Call request per seconds from remote side to to this Trunk.

Max Media Sessions: Max concurrent call in this trunk.

Note: the value should not overtop the license of SBC

Advance Features

SIP Security

SIP Security								
Priority	Description	Attacked	Detected	Action	Protected Time			+ Add
126		User Attack	Number Of Registrations/10	Drop	100/min		✎	🗑
127		IP Anti Attacking	Number Of Registrations/10	Drop	5/min		✎	🗑

Priority *	126
Description	
Attacked	User Attack
Detected	Number Of Registrations
*	10
Endpoint source	Access Network
Access endpoint	1<re_register>
Action	Discard
Protected Time *	100 min

SIP Security for protect the SBC and block the SIP attack.

Note: For SIP level only.

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Troubleshooting

Troubleshooting

SSH of SBC

```
  login as: admin
  admin@172.19.211.141's password:


BusyBox v1.22.1 (2019-01-21 11:22:54 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.

*********************************************
*          Welcome to Command Shell         *
*                                            *
*      WARNING: Authorised Access Only       *
*********************************************

> enable
admin@SBC3000 enable# show version
   Linux Version  :  3.4.39
   Hardware       :  0x2
   Root Image     :  38
   Boot Image     :  16
   App Package    :  2.90.4.2psp6
       BuildTime  :  2022-08-23 10:22:21 CST
       Builder    :  root
       Md5Sum     :  d2551be1f43ab0432f19734ee6f8a8a8
```
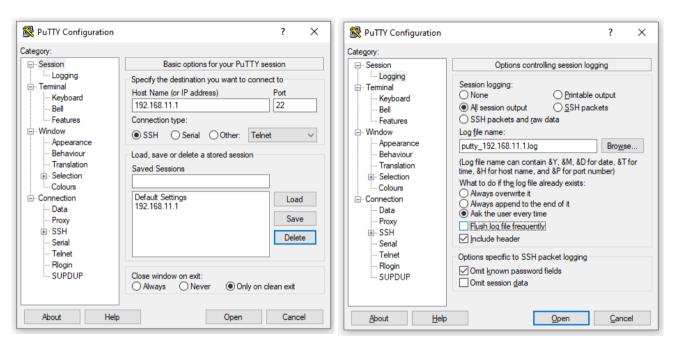
SSH is the common and safe way for troubleshooting. We can SSH the SBC through IP, the login information same of WEB login, default is admin/admin@123#

After login the CLI, we can check the device IP, version, and call statistic, monitor the call, etc.

Note:
1. Only Admin port enable the SSH authority as default.
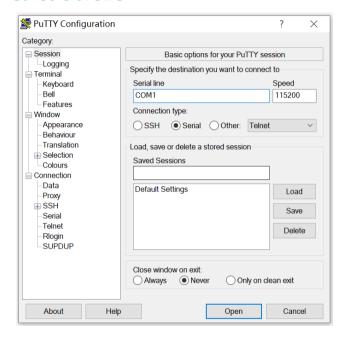2. SBC3000 default port is GE1

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Troubleshooting

SSH of SBC

At mostly, we use application putty.exe for troubleshooting that's light and easy to use.
And can save the log real time to extend file.

Troubleshooting

Console of SBC

If the device can't login the though the IP, we should check it through Console port.
The console port speed is 115200 and login information same of WEB login.
After login, input command enable, you will go to the same login interface of SSH.
Note: If the SBC forgot password, the only is Flash whole device.

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Troubleshooting

Enable Mode

```
> enable
admin@SBC3000 enable# show interface
eth0      Link encap:Ethernet  HWaddr F8:C7:23:24:1E:AA
          inet addr:172.19.211.141  Bcast:172.19.255.255  Mask:255.255.0.0
          inet6 addr: fe80::fac7:23ff:fe24:1eaa/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:73390697 errors:0 dropped:1086 overruns:0 frame:0
          TX packets:10324780 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:2469184967 (2.2 GiB)  TX bytes:282274978 (269.1 MiB)
          Interrupt:114

eth1      Link encap:Ethernet  HWaddr F8:C7:23:24:1E:AB
          inet addr:10.100.10.11  Bcast:10.100.255.255  Mask:255.255.0.0
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:15478328 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:928699680 (885.6 MiB)  TX bytes:0 (0.0 B)
          Interrupt:114
```

en   go to the enable mode
sh int   show current network
sh ver   show curent version detail

Note:
sh equal **show**
int equal **interface**
All command support abbreviation

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Troubleshooting

Enable Mode

```
admin@SBC3000 enable#
  ada          Enter ada mode
  board        Set board state
  configure    Enter configuration mode
  exit         Exit privileged mode
  fwd          Set fwd debug
  heart        dma ping pong
  log          Set log level
  mem          mem free status stack
  no           Negate a command or set its defaults
  ping         Send messages to network hosts
  ping6        Send messages to network hosts
  pprof        pprof mem cpu gc
  ps           Give details of current processes
  quit         Quit from the CLI
  reboot       Restart system or board
  reset        Restart netswitch or other...
  service      Service command
  show         Show running system information
  ssh          SSH board or subborad
  telnet       telnet subborad
  top          Give details of current processes
  trace        Trace command
  traceroute   Print the route packets trace to network host
  traceroute6  Print the route packets trace to network host
  upload       upload log memprofile
```

? Quest Mark show all the support command in list.

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Troubleshooting
Major command

show clock	show system current time and running time
show call statistic	show the device call statistic
Show call info	show current call information
show DSP info	show the device current DSP information.
show endpoint callstat	show all trunk status
show register info	show user register status
show device	show device type and SN
show error	show the log of system error
show flash	show the occupy of Flash.
show board state	show userboards status
show netstat	show network port detail
show service	show system service status
top	show the process occupy status
ps	show device process

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Troubleshooting

Trace log

```
admin@SBC3000 enable# trace
  all          Enable all trace
  board        Turn on board tracce
  call         Set sip call trace parameters
  level        Set trace level
  register     Set sip register trace parameters
  transport    Set sip transport message trace parameters
```

Trace for enable the trace, it have different type:

    all   for print call trace, this one is using normal. For example, **trace all**

    level   for set the trace level, we have disable/emerg/alert/crit/err/warning/notice/info/debug/detail

    register for set the sip register log, it have 3 parameters: User name, Access Network ID, Core Trunk ID
              For example, **trace register sunny 1023 ***

    call   For set sip call log, it have 4 parameters: CallingNum, CalledNum, InboundTrunkID, OutboundTrunk ID.
              For example, **trace call sunny 98765 10 ***

    transport   For set transport log, it have 6 parameters:
              Transport protocol, Source IP and port, Destination IP and port, CallingNum, CalledNum, SIP model.
              For example, **trace transport udp 10.10.10.10:5060 20.20.20.20:5062 sunny 123456 INVITE**

Note, if you forgot the parameter, you can use * to replace it.
trace call sunny 98765 10 * or **trace transport udp 10.10.10.10:5060 * sunny 123456 ***

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Troubleshooting

Trace log

```
admin@SBC3000 enable# trace all
admin@SBC3000 enable# ada
ada>
ada> 2023-02-23 15:39:34.256278847 [    Info]: transport_udp.go:183 udp 172.19.211.141:32000 --> 172.25.200.217:5060,
REGISTER sip:172.25.200.217 SIP/2.0
Via: SIP/2.0/UDP 172.19.211.141:32000;branch=z9hG4bK-nCLj5KPea8Xeg5CC
To: <sip:3670996808@172.25.200.217>
From: <sip:3670996808@172.25.200.217>;tag=sNoBGwip
Max-Forwards: 70
Call-ID: Yp9ZfUbP2pAT8PEmxXS11mPG0NqVQ8SR
CSeq: 65 REGISTER
Contact: <sip:3670996808@172.19.211.133:32000>;expires=1800
Content-Length: 0
```
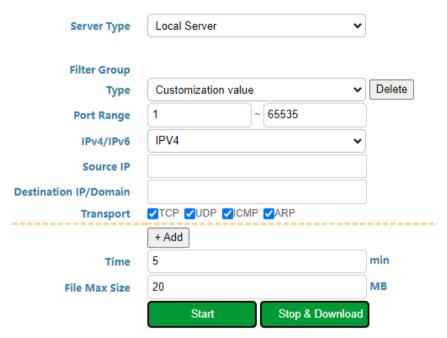
ada   After input the trace command completed, should go to the ADA mode that will print the log out.

No trace all For disable the tracde

exit   for exit the ada mode

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Troubleshooting

Capture Call

We can do capture in device GUI.

Default click the button "start" only.

If the SBC have much concurrent call, we need use IP to filer the call.

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Troubleshooting

Capture log

Capture log is very useful way also.

When the SBC have high concurrent call, we prefer to do this mode for go call log.

Note:

please choose the Level to **Debug**

FAQ

Thank You !

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