TelcoBridges TMG800/TMG3200 Commissioning Document for Metaswitch SoftSwitch System

Author	Date	Version
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1. General Information

1.1 Description

The purpose of this document is to guide TelcoBridges engineers, consultants, and customers in the configuration of the TelcoBridges Media Gateway in two distinct Use Cases in the Metaswitch Environment. The Use Cases are as follows:

> **Use Case 1** or **SS7 Signalling Relay Use Case:** Setting up a TSG or TMG as an MTP2 to M2UA Relay point to establish SIGTRAN connectivity to the Metaswitch and SS7 (MTP2) connectivity to the PSTN.
>
> **Use Case 2** or **Media Gateway Use Case:** Setting up the TMG as a controlled gateway in an MGC/MG relationship following the MEGACO/H.248 protocol Version 2. Where the Metaswitch AMGC or CFS acts as the MGC and the TMG

It should be noted that it is possible to setup the same Unit to perform both Use Cases simultaneously if the need arises. This document will address how to both steps independently as they are independent functions, but the reader may follow one after another on the same device to complete the installation of both Use Cases.

1.2 TelcoBridges Device Information

Two product families will be addressed in this document referenced as TelcoBridges Signalling Gateway (TSG) and TelcoBridges Media Gateway (TMG). For control and configuration these systems operate relatively the same as they are based on the same internal architecture, with the primary difference being that the TSG's Hardware is reduced to provide a more affordable device when only the first UseCase (listed above) is needed.

The TMG is a full featured device able to handle RTP Streams, Transcode, Perform Digit-Collection, and Play Tones and Announcements as needed in the Second Use Case. While the TSG is limited to handling the Signalling of an SS7 Uplink to the PSTN and relaying that downstream over various SIGTRAN technologies. If both UseCases mentioned above are needed, only the TMG is able to provide that.

Since many configuration options are the same between the TMG and TSG this document will use the term 'Tmedia Device' to refer to both simultaneously.

There are several models in each family that designate the varied capacity and terminations on each device which will be briefly listed on the following page. For a more complete overview please visit https://telcobridges.com/products/.

FAMILY	MODEL NUMBER	T1/E1 CAPACITY	TERMINATIONS	RTP/MEDIA
TMG	800	8-16	RJ48	Yes
TSG	800	8-16	RJ48	No
TMG	3200	16-84T1 16-63E1	RJ48,DS3,STM1/OC3	Yes
TSG	3200	16-84T1 16-63E1	RJ48,DS3,STM1/OC3	No

**It should be noted that the largest Model Number the 7800 is compatible with this environment with the maximum capacity of 16 STM-1/OC3, 48 DS3, or 1,024 E1/T1s but this document will not explain the extra complexities of initially configuring this modular unit.*

1.3 Version History

Version #	Date	Author	Reason	Description of Change
0.5	2022/10/07	Joshua Puckett	Document Creation	Initial Creation of the Commissioning Document without appendices
0.7	2022/10/17	Joshua Puckett	Document Flow	Separate TDM Configurations into their own chapters
0.9	2023/02/22	Joshua Puckett	Finetuning	Fix SS7 Repeat, create Metaswann Appendix, Add CAS Stack Configuration
0.11	2023/05/23	Joshua Puckett	Content Addition	Add CAS NAPs, Document 25892, 25821
1.0	2023/09/14	Joshua Puckett	Content Addition and Finalization	Default SDP

2. Requirements

2.1 Documentation

It is not possible to independently setup either Use Case with out strong knowledge of the environment and network at the User Premise. In the appendices of this document, you will find a Site Survey that should aide you in collecting the information needed and prepare you for the installation. It is advised that you fill this out as completely as possible before you begin your installation.

2.2 Setup

It is expected at the time of installation the Metaswitch server acting as the MGC (Use Case 2) or the ISUP Termination Point (Use Case 1) is completely configured and ready for the TelcoBridges unit to enter into the Network. While this document is not intended to aide you in this configuration it will include some references of where you find settings and values in the MetaView Explorer that must be exactly correlated with the TelcoBridges Device to aide your configuration.

2.3 Software

The full interoperability between a Metaswitch Environment and TelcoBridges equipment has been tested at length by both respective companies, and changes have been made in the software to achieve this full featured functionality. As such it is imperative to ensure that both your Metaswitch Environment and your TelcoBridges Equipment are running on the minimum supported Firmware versions for these Use Cases. Please find the current minimum supported versions below:

Manufacturer	Device	Firmware	Date Verified
Metaswitch	CFS	V9.6.50+	Sept-2022
Metaswitch	SAS	V12.40+	Sept-2022
Metaswitch	MVS	V9.6.50+	Sept-2022
TelcoBridges	TSG/TMG	3.2.58+	May-2023

2.4 Licensing

For the Media Gateway Use Case* you will need to obtain the ‘SAS_CLIENT’ License to enable Metaswitch Proprietary Features. For the SS7 Signalling Relay Use Case you will need to have as many MTP2 and M2UA Link Licenses as you wish to configure.

**Certain CODECs such as AMR and AMR-WB need additional licensing as well, please talk to your Sales Contact at TelcoBridges to ensure you have everything needed enabled upon ordering.*

3.Initial Configuration

Needed for both Use Cases

3.1 Introduction

In this section we will describe initial configuration along with explaining some general concepts that apply to both Use Cases mentioned in this document. It is not the purpose of this document to duplicate information readily available and as such important information such as Physical Installation, Product Differentiation, and Initial Configuration are not present here. If this is your first time with any of TelcoBridges products or if you have questions on any of the above please reference our list of installation manuals which can be found here:

https://docs.telcobridges.com/Tmedia_Products_Installation

It should also be noted that all of TelcoBridges documentation is open to the public and you can search for any specific topics if you would like more elaborative information.

https://docs.telcobridges.com/

3.2 Configuration Wizard

The first time you connect to a TelcoBridges device you will be asked a few questions about your environment. Primarily if you are setting up you device to be in a 1+1 redundant setup or if it will be a stand-alone system. If your system is a stand alone you can follow through the guided Wizard and check the Installation Guide provided in the previous section if there any questions.

3.2.1 1+1 Configuration

The ‘one plus one’ or 1+1 configuration on the Tmedia is designed to eliminate any single point of failures in your network by providing a completely redundant product switched together through a passive TDM patch panel to allow either box to receive/send on the TDM lines. VoIP and Networking services are switched over dynamically so regular IP Switches can be used. It is important to note that these systems exist in a Primary/Standby status and when first configuring your Tmedia equipment in the wizard you should know which one is to be designated as a Primary. Exhaustive installation instructions can be found in the Product Installation documents listen in section 3.1 as well as a brief over posted at the end of this section. One important thing worth noting is that the two units need to communicate directly over a private subnet to allow seamless switchover and communication. By default they will use **VLANs 710 and 711** along with these **IP Ranges: 172.30.30.0/29 and 172.30.31.0/29**. If those are conflicting with your internal network you will need to change them in the Configuration Wizard.

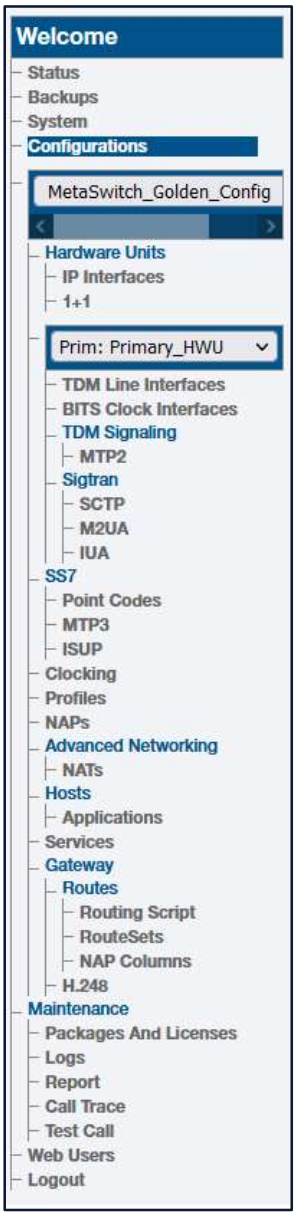
https://docs.telcobridges.com/Tmedia_1%2B1

3.3 Configuration Overview

The Tmedia Device has two separate intelligent internal components, while other legacy names for these components exist the WebGUI refers to them as the **Host** and the **Hardware Unit**. It is important to understand their relationship and their functions to fully understand how the Tmedia device operates.

Host: The host is running a COTS Linux operating system on an x86 architecture and handles the management and monitoring of the Hardware Unit.

Hardware Unit: The Hardware Unit is running a proprietary RTOS (Real Time Operating System) with parts specifically designed to handle the TDM/Voice load our systems are able to handle.



On Figure 3-1 to the left you can see the Navigation Pane in a nested hierarchy. In this example “Metaswitch_Golden_Config” is the name of the current configuration being configured/viewed and “Primary_HWU” is the name of the Hardware Unit being configured. The options available on this menu are controlled by the ‘Web Profiles’ of each configuration, while this is out of scope of this document you can find more information here:

https://docs.telcobridges.com/Toolpack:Web_Portal_Profile_C

By the nesting of the list we can see that somethings apply in different places. The four links (**Status, Backups, System, and Configurations)** above the configuration name, and everything below **Maintenance** are global values that apply outside of an individual configuration. **TDM Line Interfaces** are directly under the Hardware Unit, while **H.248** is nested under the configuration but not under the Hardware Unit, as the host handles H.248 Configuration.

3.3.1 Configuration Management

After completing the Configuration Wizard you will have a default configuration labelled '**config_1**' This configuration will have simple things completed for you, such as associating the **host** with the **Hardware unit**, or the **hosts** with the **Hardware units** in a 1+1 setup. By navigating to `http://[ipaddress]:[port]/configurations` you will see a list of configurations on the unit. It is our recommendation that you copy '**config_1**' and begin editing your copy so that you always have a clean copy of the shipping config.

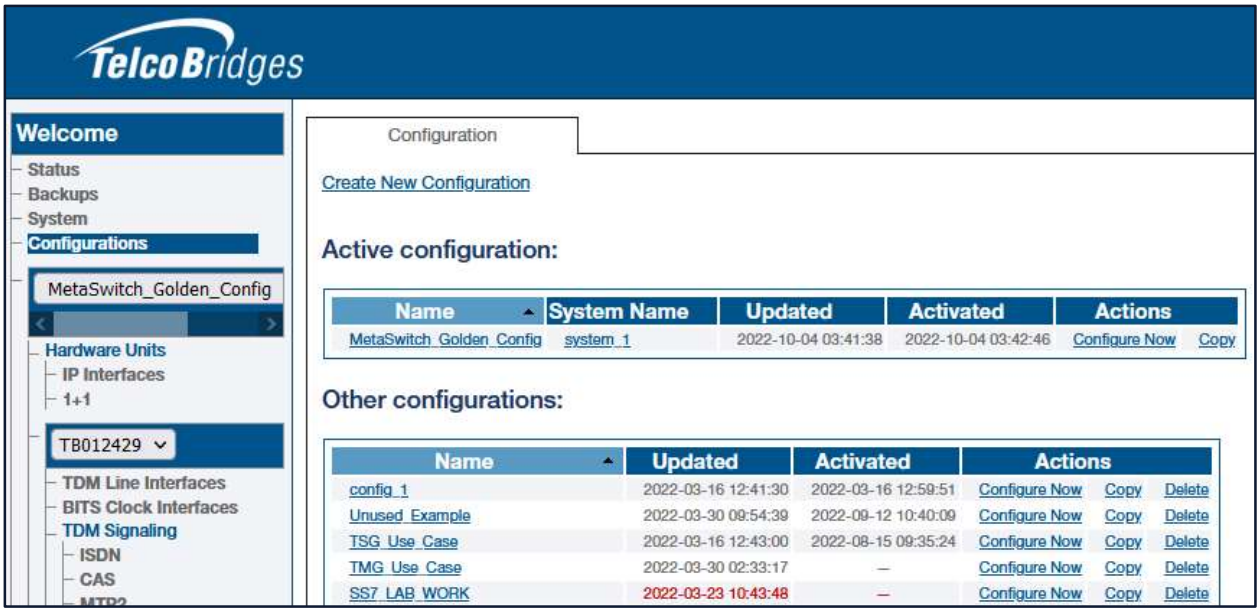


Figure 3-2

In Figure 3-2 you can see there are two tables of Configurations. "Active Configuration" and "Other Configurations". It is important to note that while you can store many configurations on the Tmedia device only one will be the 'Active Configuration' which is applied across the Host and the Hardware Unit. It is also important to note **changes in an active configuration <u>will not</u> take effect until the configuration is re-activated.**

The 'Configure Now' button will change the configuration the WebGUI displays on the left-hand most part of Figure 1. Enabling the user to compare, check, and create configurations that are not in the 'Active' state.

Activating a configuration will put the config through a few validation checks to ensure nothing is obviously misconfigured. Small changes will not cause any service disruptions but if you change fundamental communication methods (i.e. TDM Payload) then the lines effected will need to be rebuilt causing disruption on the lines changed. To Activate the configuration navigate to '**System**' at the top of the Navigation Pane and select the desired configuration from the drop down under **'Activate Configuration'** and click Activate (As shown on Figure 3-11).

3.4 Management and Ethernet Ports

3.4.1 Out of Band Management

By default the Management Port is the only way to access the WebGUI and SSH controls of the **Host** where the configuration is done. This is physical port is directly tied to the Host and can not be used for RTP traffic. To modify the management address SSH into your unit and utilize the `tbchangeip` command as shown in the figure below.

```
[root@TB012429 ~]# tbchangeip

################################################################
# Ethernet port labelled 'mgmt0' in front of the TMG3200V4
#


 'mgmt0' is a public network interface to access the Tmedia and the web portal

 Network Setting              = 'static'
 IP address                   = '192.168.100.252'
 Network mask                 = '255.255.255.0'

################################################################
# TMG3200V4 network default gateway address
#
 Default gateway IP address is '192.168.100.1'

################################################################
# TMG3200V4 DNS
#
 DNS server IP                = '173.231.100.1'
 DNS server IP                = '198.154.185.1'


Do you want to modify the network settings (enter 'help' for usage) ?[No]
```

Figure 3-3 - tbchangeip

For more information about this tool please reference our documentation
https://docs.telcobridges.com/TMG:Change_Management_IP_Address

3.4.2 Ethernet Port Management

When selecting **IP Interfaces** from the Navigation Pane *(shown in Figure 3-1)* you will notice that there are three divisions in the Ethernet Management.

Physical Ports: Physical port configuration consists of Duplex/Speed negotiation and an option to force the physical port down. This is Layer 1 of the OSI Module.

Virtual Port: Virtual Port configuration allows you to set VLAN tags along with selecting which Physical Port this logical connection will use. You may select more than one Physical Port in which case the Tmedia device will use them in an Active/Standby manner. This is Layer 2 of the OSI Module.

IP Interfaces: IP Interface configuration allows you to set your IP Address, Subnet Mask, Gateway, and applicable services. Each IP Interface needs to be bound to a Virtual Port, which in turn is bound to a Physical Port(s).

3.4.3 In Band Management

Later on in this document we will expand on the Services selectable in the **IP Interfaces** section, but if you wish to be able to manage your device through the VOIP Ports *(Directly connected to the Hardware Unit)* you will need to create an IP Interface bound to the proper **Virtual Port** with the **FIXED MANAGEMENT** service selected under "Services to use"

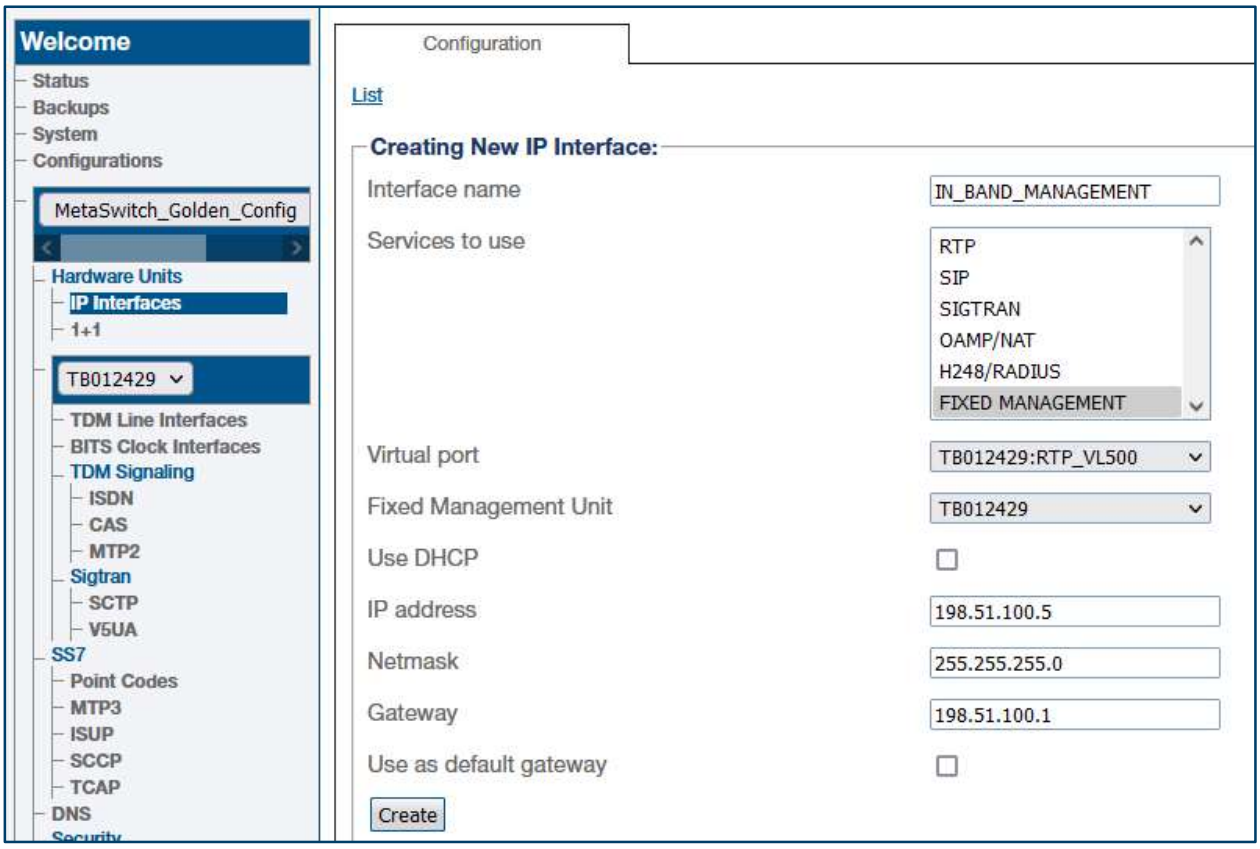


Figure 3-4 In-Band Management

Note: Unlike the Out of Band Management Port this IP Interface is a part of the configuration, so changing to another configuration could cause you to lose access to your device.

3.4.4 HTTPS

Near the bottom of the left-hand Navigation Pane is an option labelled "**Services**" this link will bring you by default to the NTP Configuration, but on the top of your page you will see navigation tabs to bring you to other services such as "**HTTP**"



Figure 3-5 Services

Here you will be presented with a list of HTTP Services you currently have configured *(one by default)* and clicking on that service will allow you to change the port, IP Interface, and force HTTPS if desired.

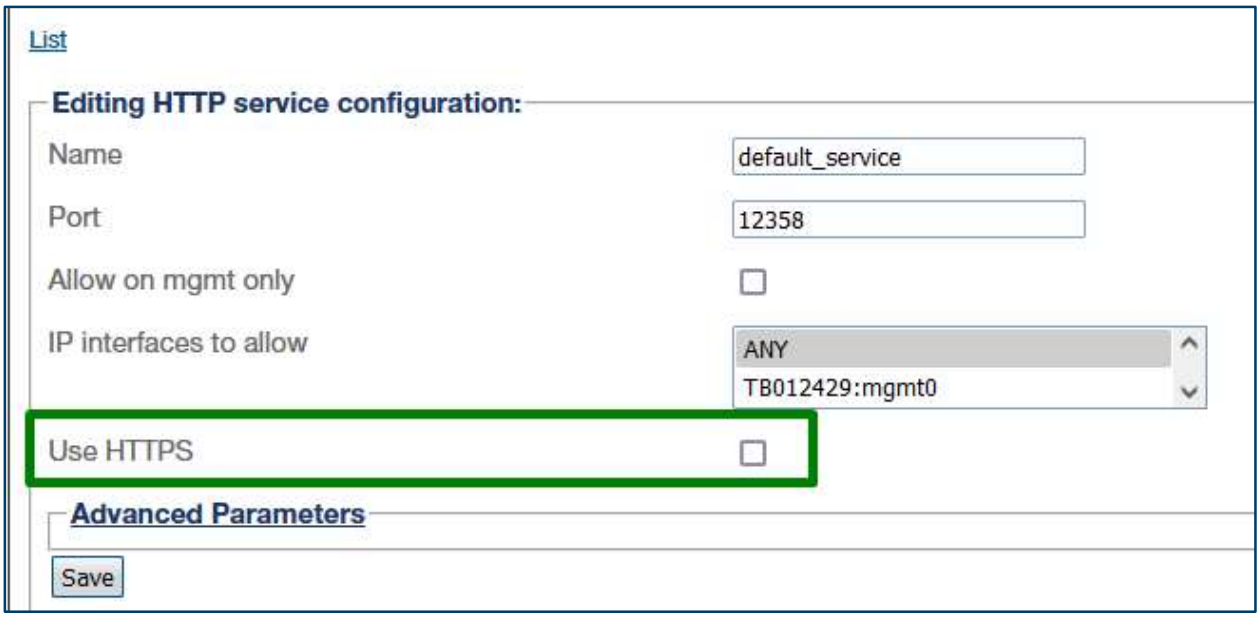


Figure 3-6 HTTP Service

Once again this setting is part of the configuration and can be modified by activating a new config.

3.4.5 SNMP

In the same section of **Services** you will see an **SNMP** tab as shown in Figure 3-5, here you will have all the options for configuring SNMP v1, v2, and v3, along with a Trap Destination.

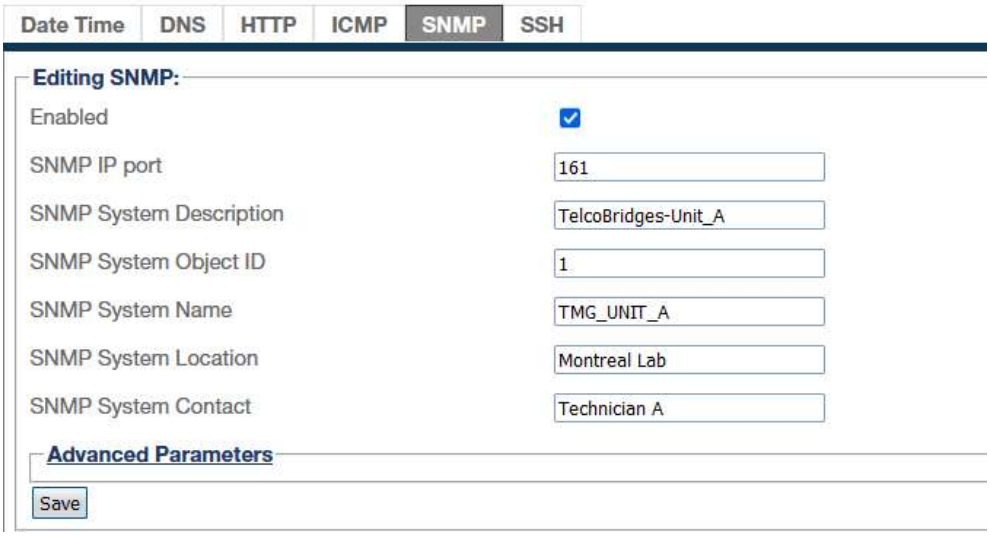


Figure 3-7 SNMP Global Configuration

At the top of the page you will see Global SNMP Configuration such as Port Number, Object ID, and System Name. Below you will see specific configuration such as v1/v2 Communities, SNMPv3 Users and a Destination for SNMP Traps.



Figure 3-8 SNMP Specific Configuration

For extensive information on SNMP, The MIBs we use, and our own Corporate MIBs please visit our documentation: https://docs.telcobridges.com/SNMP

3.4.6 Web Users and Web Group

Web Users can be accessed from the very bottom of the Navigation Pane. These settings exist **outside** of a configuration and are global to the unit. Activating a new configuration will not change the Web Users, Web User Groups, or their Rights and Access.

When you land on the 'Users' you will by see the option to "Create New Web User", but just above that you will see three tabs '**Web Users**', '**Web User Groups**', and '**Security Settings**'.

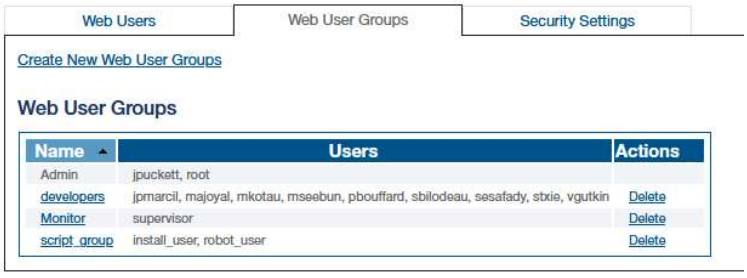


Figure 3-9 Web User Groups

In ‘Web User Groups’ you can create groups and control their Read/Write access, and then create users inside those groups in the ‘Web Users’ tab. ‘Security Settings’ allows you to set System Timeout and enable Password Complexity rules.

3.5 License Management

Nested under ‘**Maintenance**’ is a page called ‘**Packages And Licenses**’, in this page you are able to upload and install new licenses if needed. As mentioned in **Section 2.4** certain features are licensed on the Tmedia device. If you need a license containing new features please contact a TelcoBridges Sales Representative. If you need to access a copy of a license you already have been provided please use our portal: https://dashboard.telcobridges.com/

Note: Some License changes will cause the Hardware Unit to need a reboot which will disrupt service.

3.6 Firmware Management

In the same ‘**Packages And Licenses**’ page mentioned in the previous section you are able to upload and install new Firmware Packages.

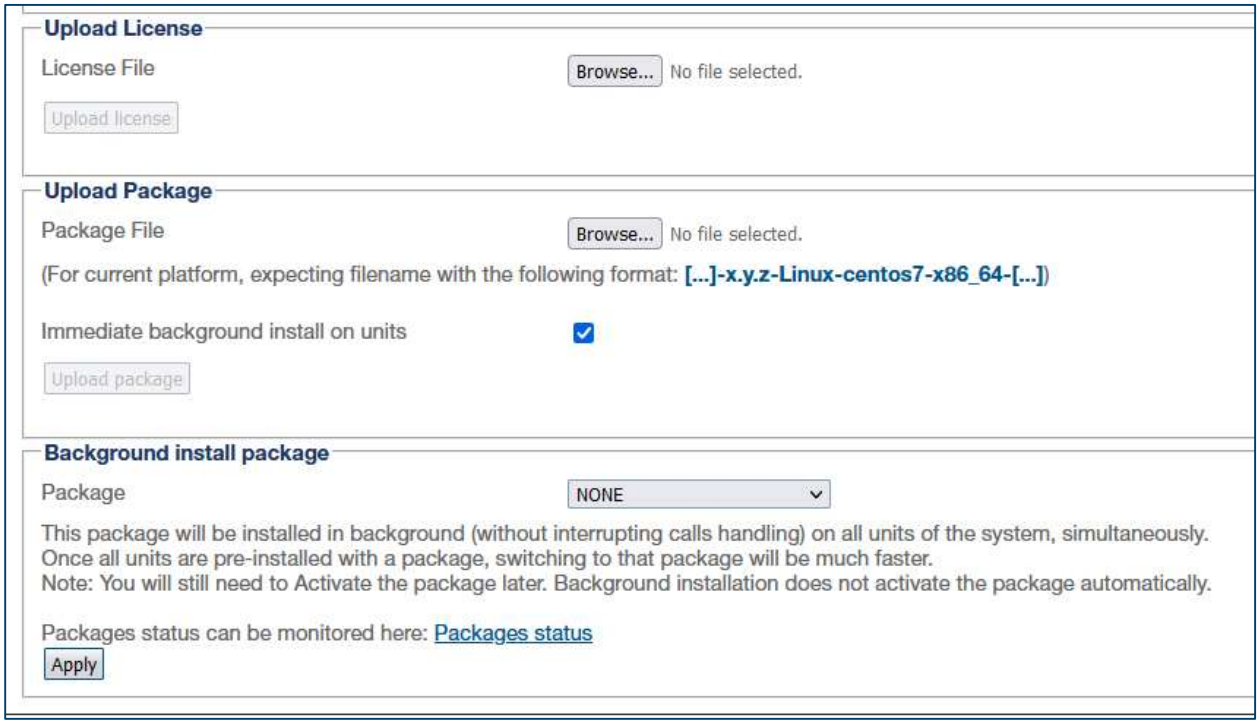


Figure 3-10 Upload Packages and Licenses

Installation of a new Firmware Package will **not** disrupt service in anyway, the Tmedia device is capable of having multiple versions of Firmware installed and until a user ‘Activates’ the new version it will rest dormant on the system. This approach can reduce the length of maintenance window and enable a quick roll-back in event of an issues with the new Firmware Version.

To Activate the new package, and actually switch the version of Firmware the Tmedia device is using navigate to **System** and select the appropriate package (that has been installed already) from the drop down and select '**Activate**'.

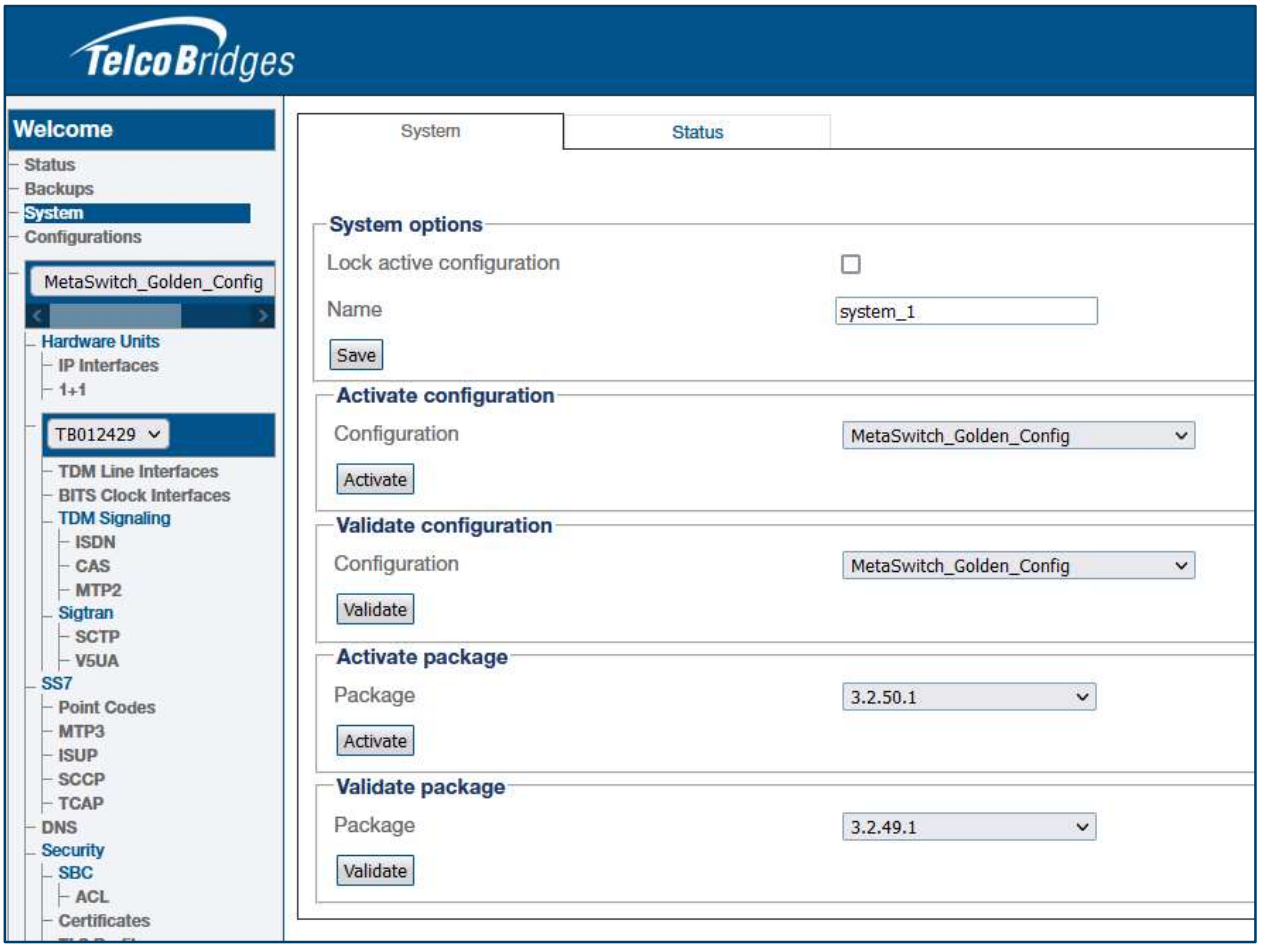


Figure 3-11 Systems Page

3.7 Database Management

All configurations are stored together in a MySQL Database *(Now MariaDB)* on the **Host** and when a certain configuration is activated necessary parts are pushed to the **Hardware Unit**. Near the top of the Navigation Pane there is a link for '**Backups**' where you can manually create a full backup of this Database which will preserve **ALL** configurations on the unit (Active and Other) in a compressed .sql.gz file.

These backups once created can be taken off the system via SFTP or downloaded directly from the WebGUI. They can be stored in case of a disaster and then uploaded to the same or a different system at a later date to recover the configurations.

To create a new Database backup simply click the '**Create**' button in the backups page. Likewise to download a package simple click the '**Download**' button next to the file you wish to download.

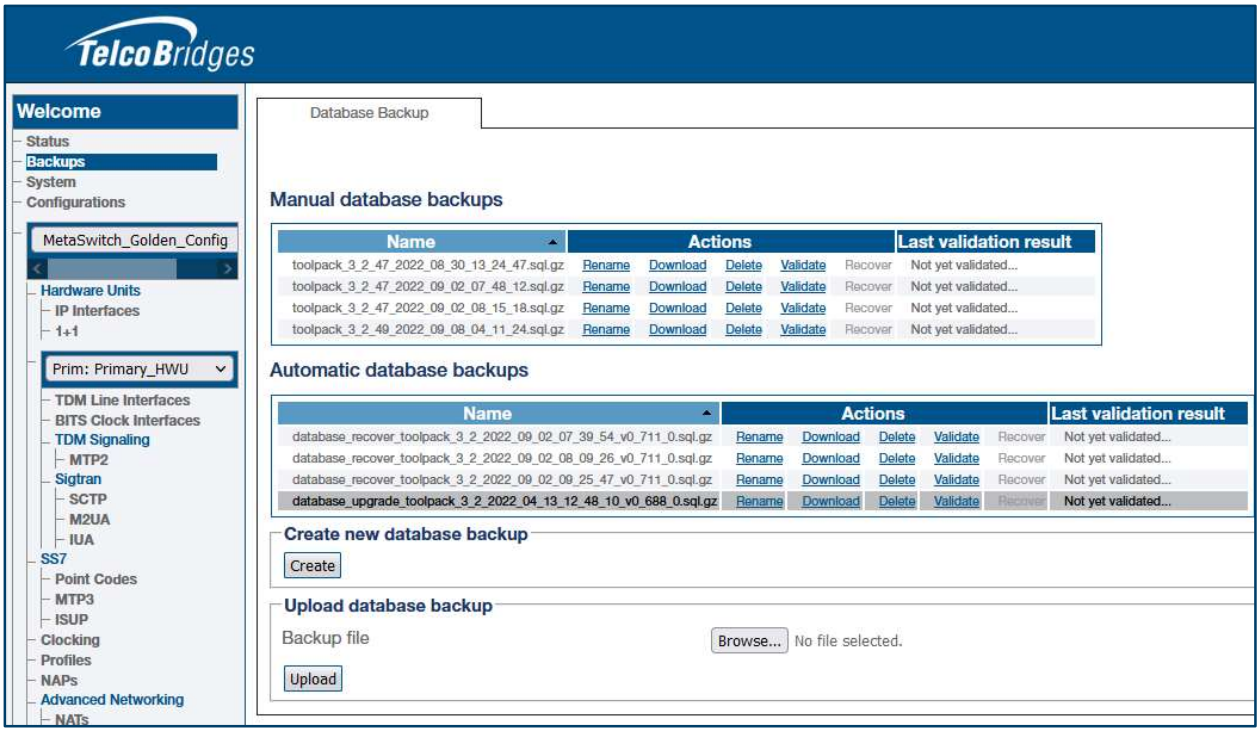


Figure 3-12 Backups

There are tools available to setup automatic backups in your unit if you desire. To find information on those tools please check our documentation.

https://docs.telcobridges.com/Scheduled_Database_Backup

4. TDM Interfaces

Setting up the TDM Signalling will vary greatly depending on your Physical TDM Interfaces and the encapsulation/payloads/framing they need. But does not differ between the two Use Cases in this document, so it is left here in the General Information section. *Please read this section in it's entirety to better understand the configuration methods, terminologies, and procedures.*

4.1 TDM Configuration – Global Overview

Line Interface is the generic term for the Physical TDM Interface and is the first thing that must be configured in all TDM Configurations. In a unit setup to have 84 T1's. Tmedia requires that each Line Interface has at least one child object called a Line Service where additional framing and encapsulation parameters are set.

Line Services are child objects of a Line Interface, by referencing the Figures in *Section 4.1.1* you can see that the complexity and the number of Child Line Services vary greatly between a TE setup and an STM-1, use the Figures below to know how many of each nested Line Service in each section. *Note: The WebGUI refers to a Line Service that is a Child of another Line Service (Not a Line Interface) as a* ***Leaf Line Service****.*

4.1.1 Physical Interface Overview

Our devices come in three possible TDM Port Configurations.

TE – The TE Gateway has either RJ48Cs or a SCSI Connector to an RJ48C Patch Panel. This is the simplest configuration as you can directly configure your E1s or T1s with very little extra info needed. Please note that the framing of the E1s can be set to 'Auto'.

Possible Configurations:

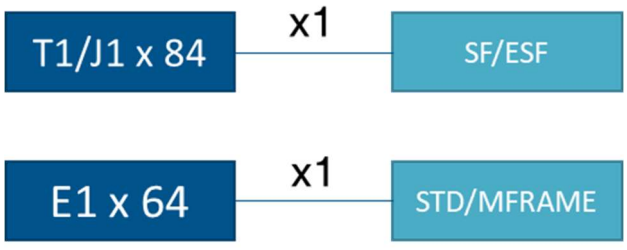


Figure 4-1 TE Configuration

DS3 – The DS3 Gateway has Dual BNC Interfaces and a DS3 Line Interface must be configured before you can configure your E1s or T1s. Please note the framing of the E1s can be set to 'Auto'.

Possible Configurations:

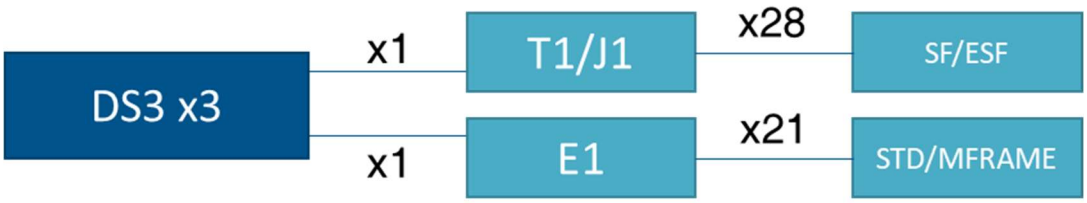


Figure 4-2 DS3 Configurations

STM-1 – The OC3/STM1 (SONET/SDH) has two SFPs fitted with Optical Interfaces and is the most variable of the configurations. In nearly all cases OC3 is used for T1 Lines while STM-1 is used for E1, but other less common configurations may exist. Please refer carefully to the Figures below for configuration variables and you can reference our documentation here for more information: https://docs.telcobridges.com/SONET/SDH_interfaces

Possible Configurations:

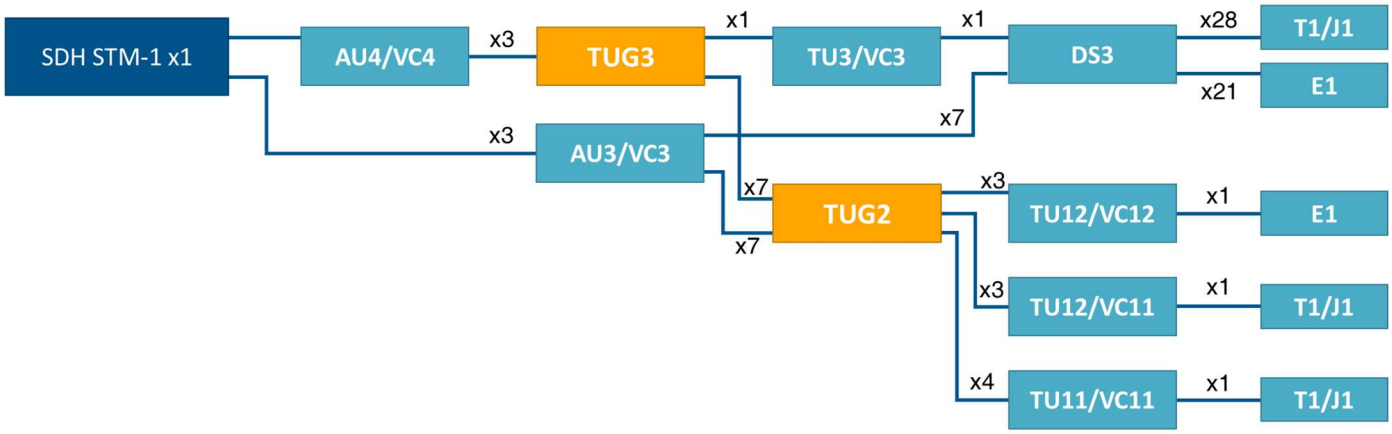


Figure 4-3 STM-1 Configuration

and

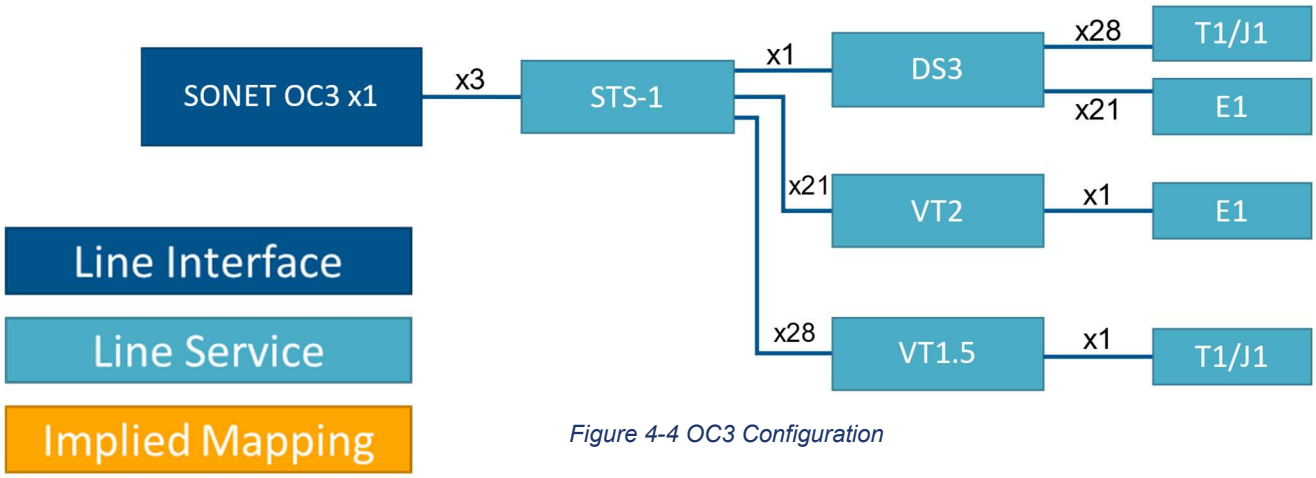


Figure 4-4 OC3 Configuration

All Configurations above are the lower levels of a PRI Configuration, regardless of if you are using SS7, ISDN, or H.248 these must be set up.

4.1.2 Configuring Multiple Line Interfaces

As shown in the figure below, when creating a Line Interface there will be an option to 'Create Multiple Line Interfaces'. This is very useful when you have many Lines to configure with the same configuration options.



Figure 4-5 Create Line Interface Links

For the most part the configuration options are the same except for a few parameters shown and explained below.

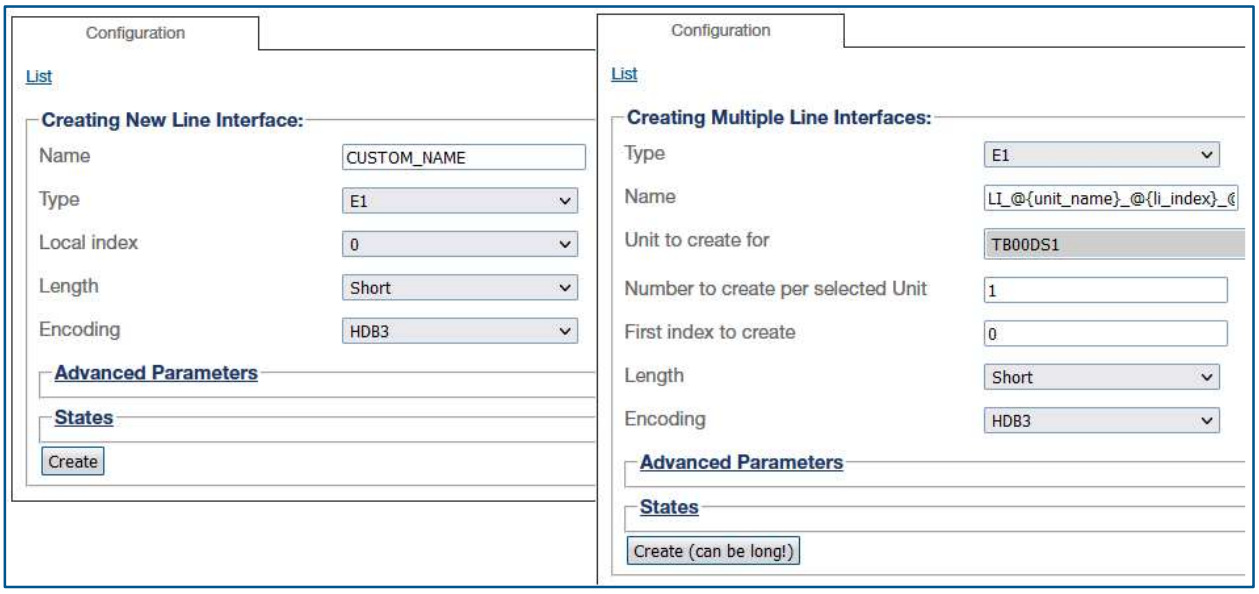


Figure 4-6 Creating Multiple Line Interfaces

Name: When creating a single Line Interface the name entered is literally applied to the Interface, but in the Multiple Line Configuration options there are variables that can be used to assist you in creating unique names across all Lines.

- @{counter} -> Starts at 0 and increments for each interface
- @{unit_name} -> The name of the Hardware Unit
- @{unit_serial} -> The Serial Number of the Hardware Unit
- @{li_type} -> The type of Line Interface
- @{li_index} -> The Physical Port of the Line Interface (Starting at 0)

By default the system will suggest a name like: `LI_@{unit_name}_@{li_index}_@{li_type}`

Which will create names looking like `LI_TB001234_00_E1 – LI_TB001234_63_E1`

Unit to create for: This is the Hardware Unit the **Host** will configure the lines for, in systems with one Hardware Unit or the secondary Hardware Unit in a 1+1 Configuration this can be ignored.

Number to create per selected Unit: This is how many Line Interfaces are being created.

First Index to create: This specifies the internal index of the Physical Interface always starting at zero, i.e. the 12th RJ48C on a TE unit is **Index: 11**.

4.1.3 Creating Multiple Line Services

After successfully configuring the required Line Interfaces the names will become a link to re-enter the configuration page of that Line Interface. Once on that page there will be two links in the top left to configure '**Child Line Services**' similar to the links shown in the previous section.



Figure 4-7 Create Line Service Links

Once again by selecting '**Create Multiple Child Line Services**' there are a few extra parameters to facilitate the creation of many Line Services at once.

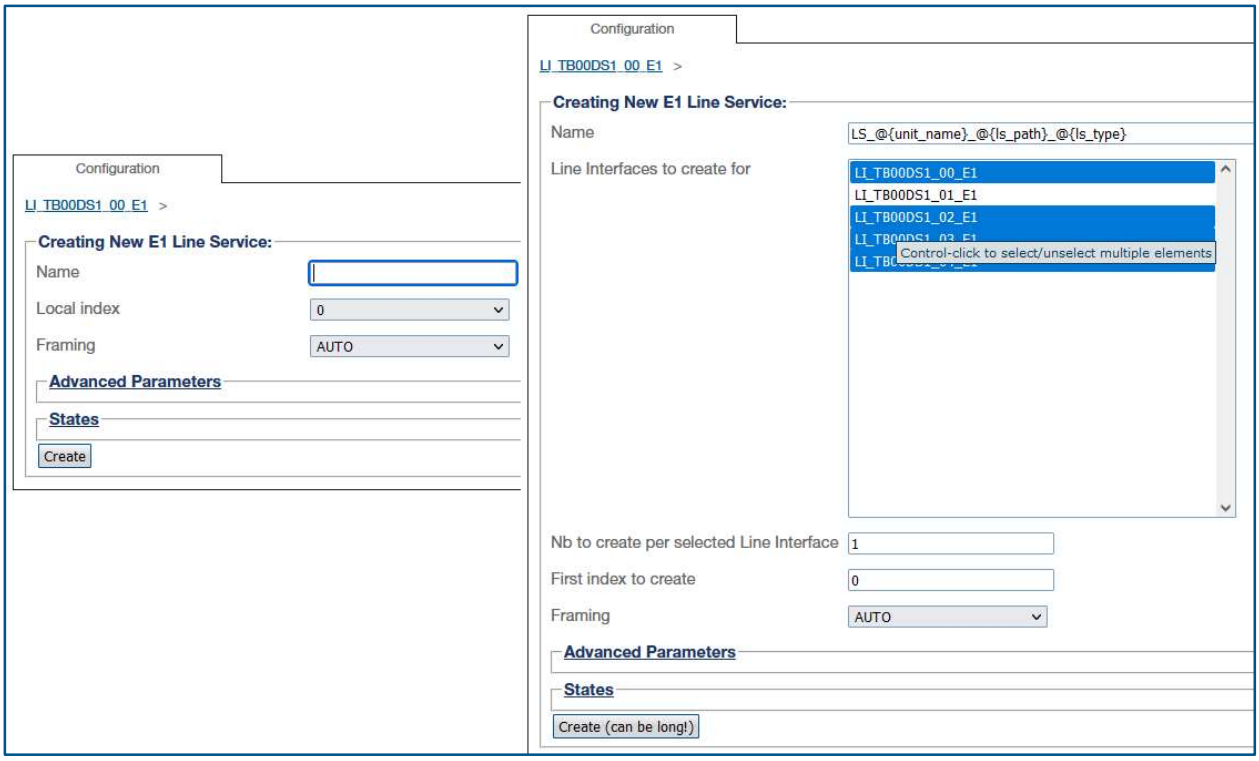


Figure 4-8 Creating Multiple Line Services

Name: When creating a single Line Service the name entered is literally applied to the Service, and once again in the Multiple Line Configuration options there are variables that can be used to assist you in creating unique names across all Lines. All the variables from creating a Line Interface are usable here, along with three new ones **bolded below.**

- @{counter} -> Starts at 0 and increments for each interface
- @{unit_name} -> The name of the Hardware Unit
- @{unit_serial} -> The Serial Number of the Hardware Unit
- **@{li_name} -> The Parent Line Interface Name**
- @{li_type} -> The type of the **Parent** Line Interface
- @{li_index} -> The Physical Port of the **Parent** Line Interface (Starting at 0)
- **@{ls_index} -> The Line Service Index** *(Will always be '0' on a TE Device)*
- **@{ls_type} -> The type of Line Service** *(Is the same as @{li_type} on a TE Device)*
- **@{ls_path} -> The full index path of the Line Service, including the indices of the parent Line Interface**

By default the system will suggest a name like: `LS_@{unit_name}_@{ls_path}_@{ls_type}`

Which on a TE Device will create names looking like `LS_TB001234_00_E1` – `LS_TB001234_63_E1`

Line Interfaces to create for: Each Line Interface selected here will have a Line Service(s) created for it, allowing the creation for all E1/T1s at once. As shown in *Figure 4-8* multiple Line Interfaces can be selected by using Ctrl+Click or Shift+Click.

Number to create per selected Line Interfaces: This is how many Line Services will be created for each of the Line Interfaces selected. Selecting 64 Line Interfaces and leaving this value at 1, will create 64 Line Services, 1 per Line Interface.

First Index to create: This specifies the internal index of the Line Interface always starting at zero. A T1/E1 Line Interface will only have a single index of zero available, but other types may have more.

4.2 TDM Configuration – TE Unit

Using the information and figures in *Section 4.1.1* map out your desired payloads and encapsulations of each interface before beginning configuration.

4.2.1 Line Interface – TE

On your Tmedia TE Unit Navigate to '**TDM Line Interfaces**' where you will be presented with an empty table with two links above. '**Create New Line Interface**' and '**Create Multiple Line Interfaces**'

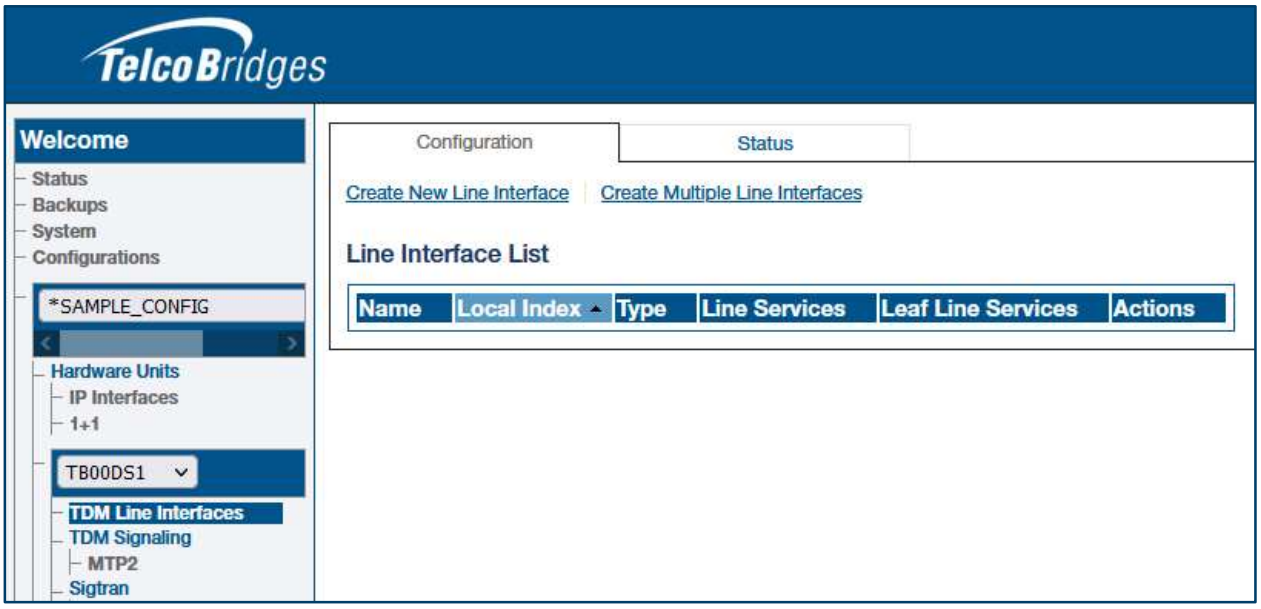


Figure 4-9 Line Interface List

Both options, creating multiple or one at a time, will allow you to set up your initial type of interface (In this case it's J1, T1, or E1) and the Encoding. Creating one at a time will allow you to fully customize the interface name, while there are variables you can use when you create multiple.

Figure 4-10 Creating TE Line Interfaces

Creating A New Line Interface:

Name: The name of this Line Interface, appears exactly as written.

Type: E1, T1, or J1

Local Index: This is the physical index number of which TDM Port to use, our count on this index always starts at **zero**.

Length: In nearly every case the length should be chosen between one of the first two options: Short Mode for 200m (655 feet), Long Mode for 685m (2,250 feet)

Encoding: HDB3/AMI for E1 and B8ZS/AMI/AMI Clear for T1/J1

4.2.2 Line Service – TE

As we can see from *Figure 4-1 TE Configuration* the TE Configuration is by far the simplest. You will create a single **Line Interface** for each T1/E1and a single Child **Line Service** for each Line Interface.

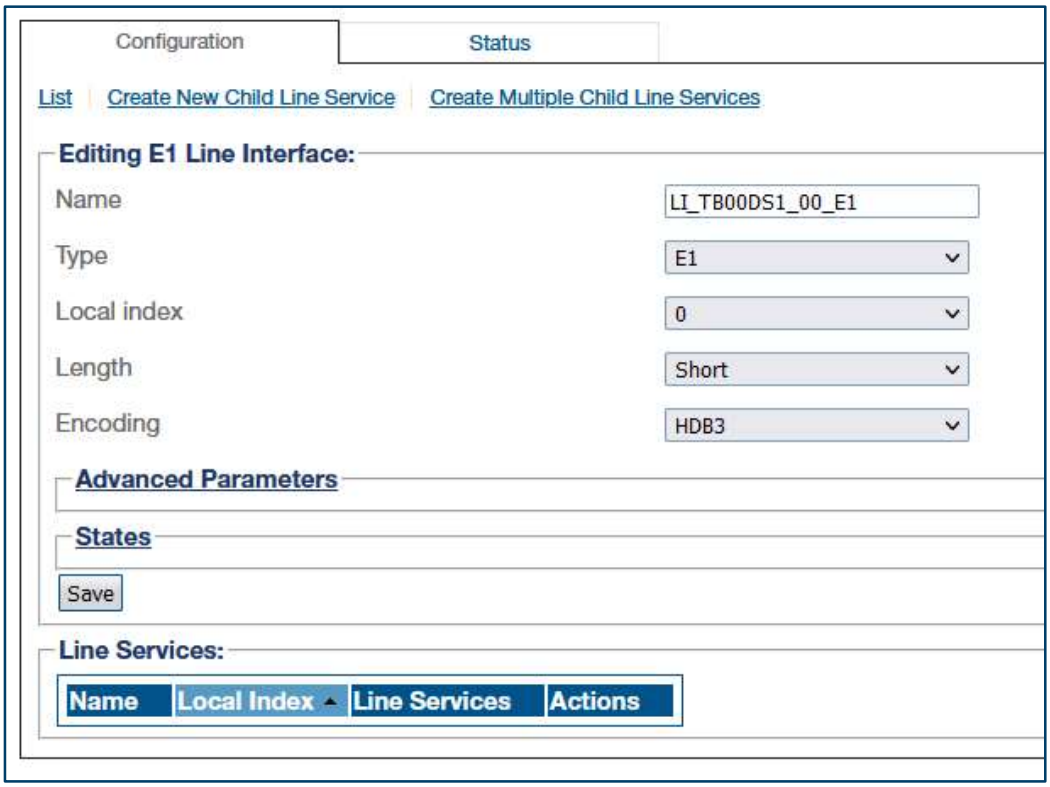


Figure 4-11 TE Line Interface

In the figure above we see an already created **Line Interface** type **E1** and we see at the top similar links to what we saw before. Creating a single Child Line Service will ask you for Name, Local Index (Always 0 in this case as it is the only index in a single T1), and Framing.

With only one added complexity in the '**Create Multiple Child Line Services**' link.

Line Interfaces to Create for: In this section you will see every Line Interface you have configured, the WebGUI will allow you to select as many you would like using either 'Shift+Click' to select a continuous group, or 'Ctrl+Click' to select individual Line Interfaces.

Nb to create per selected Line Interface: This is slightly different than the Multiple Line Interfaces because it is not asking you how many **per Hardware Unit**, but rather how many per **Line Interface.** This value will always be set to one in this stage, as you can see in the example below I have four of five **Line Interfaces** selected which means I will create four Child Line Services, one per each selected Interface. *(As with the Single Example, index will always be 0)*

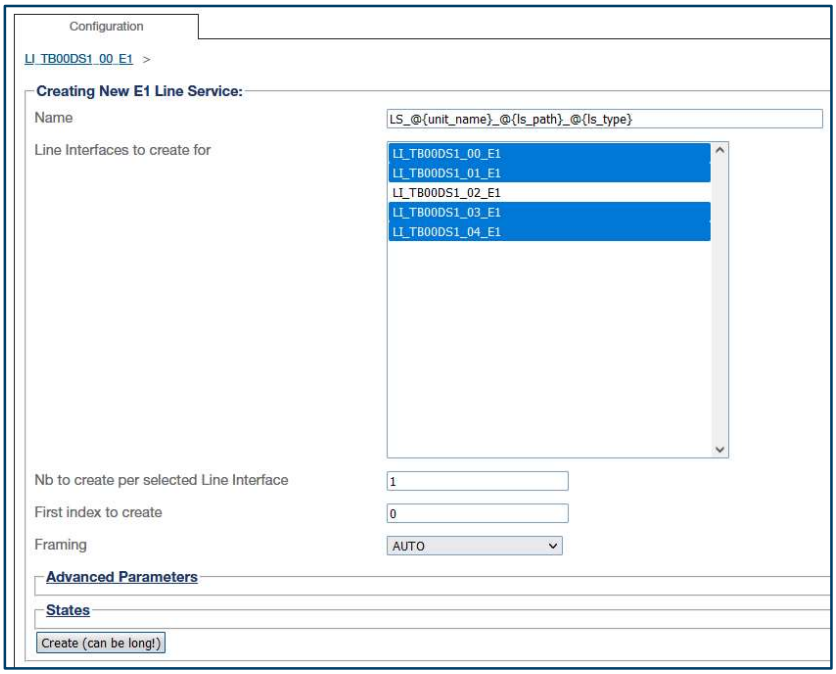


Figure 4-12 TE Multiple Line Services

4.3 TDM Configuration – DS3 Unit

4.3.1 Line Interface – DS3

With a fully equipped Tmedia DS3 device you should create three Line Interfaces.

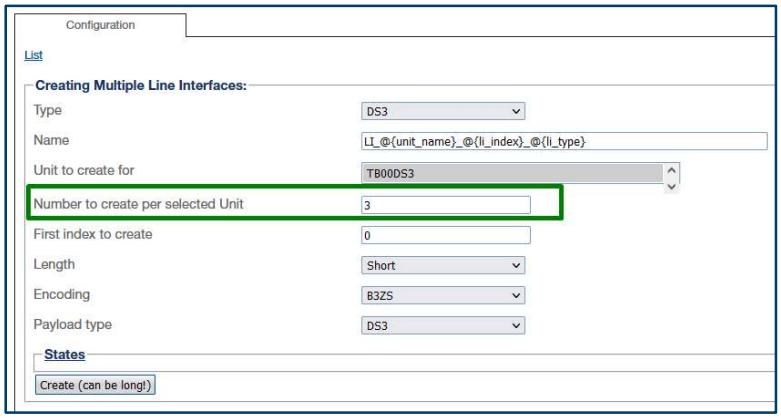


Figure 4-13 DS3 Multiple Line Interfaces

The naming variables can be seen via a tooltip on the WebGUI or they can be reviewed in Section 4.2.1. Once again we will start on Index zero, and specify that we wish three Line Interfaces to be completed. Once this is done we are ready to move onto Section 4.3.2

4.3.2 Line Service – DS3

If you refer to *Figure 4-2 DS3 Configurations* you will see that after the Line Interface is created we need to create one Child Line Service for each DS3 and then multiple Child Line Services for each of those Child Line Services. *(The WebGUI refers to Line Service that is a child of a child as a '**Leaf Line Service**')*

Despite only needing one Line Service per DS3 we can still use the link '**Create Multiple Child Line Services**' as we will be able to select each **Line Interface** and instruct the WebGUI to create a Line Service for each one.

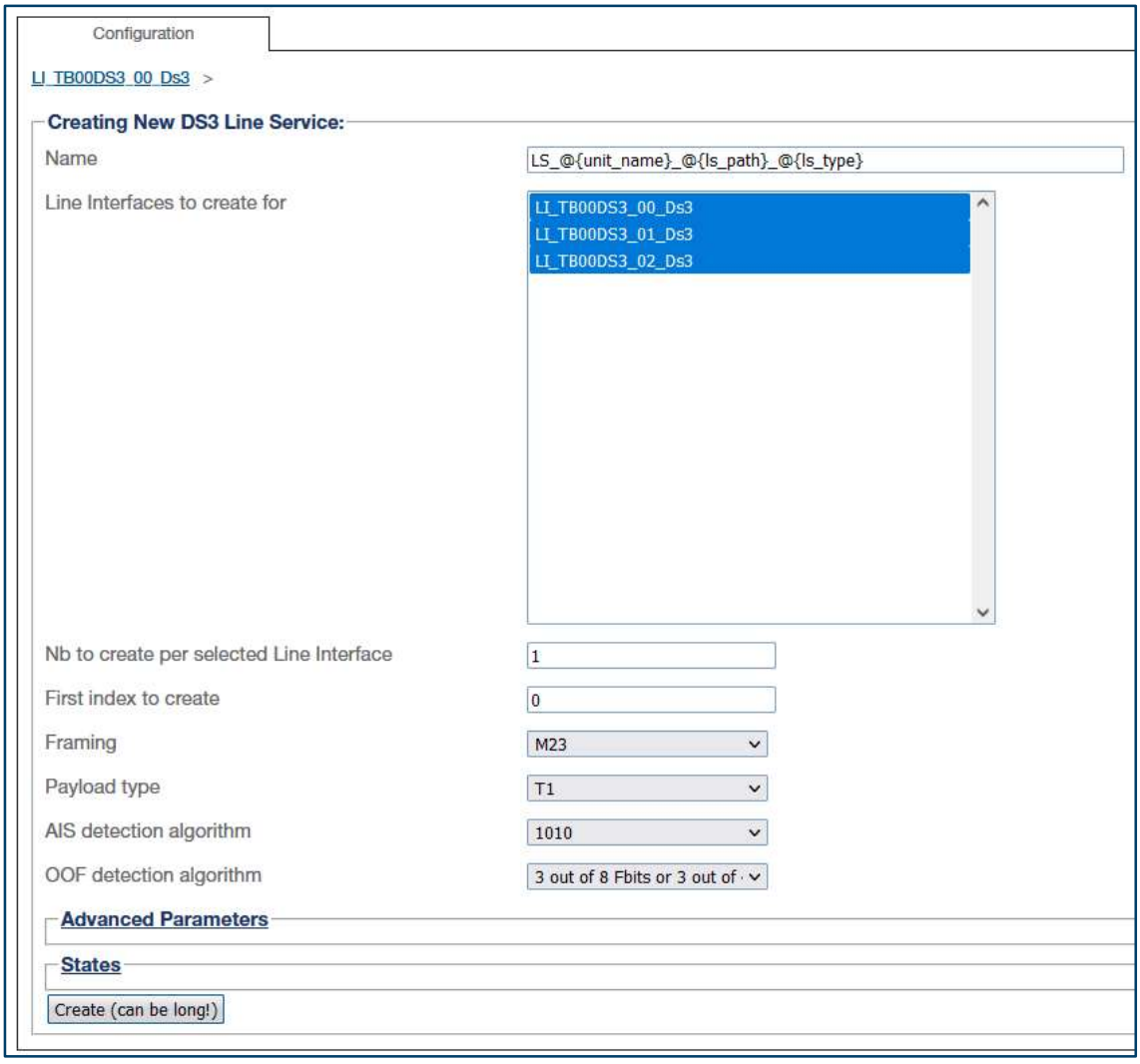


Figure 4-14 Create Multiple DS3 Child Line Services

One Child Line Service per Line Interface means that the '**First index to create**' will always be zero, and the '**Nb to create per selected Line Interface**' should remain at one. This will create three Child Line Services in total. Once this is done we can navigate to "TDM Line Interfaces" on the Navigation Pane and see they have been created correctly, but also that we are missing our "Leaf Line Services"



Figure 4-15 DS3 Line Interface List

From that screen click on one of the Line Services that you just made and once again click the link '**Create Multiple Child Line Services**'. This will bring you to the final stage in DS3 TDM

Configuration and allow you to make all of your E1/T1/J1s. In a T1/J1 Configuration there can be 28 T1/J1s per DS3 and in an E1 there can be 21.

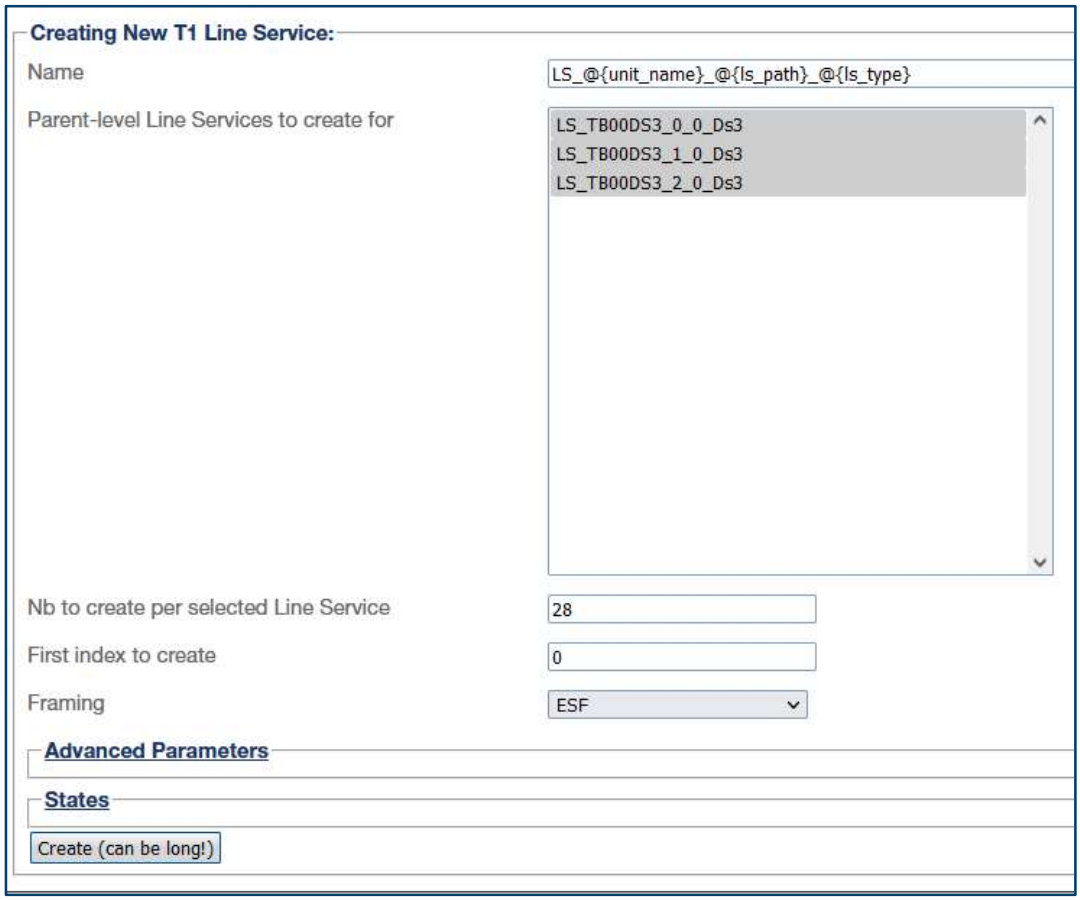


Figure 4-16 Create Multiple Leaf Line Services

Once again we see this familiar page with the same variables in the naming scheme. Here we have selected all three **Line Services** and have set our '**Nb to create per selected Line Service**' to 28, as this example is using T1s. Then set the framing and click "**Create (can be long!)**". Don't worry if the WebGUI hangs a bit after clicking create as it is now making 84 Child Line Services behind the scenes and it does take a moment.

Once that is done we can navigate back to '**TDM Line Interfaces**' and check that all **Leaf Line Services** have been made correctly.

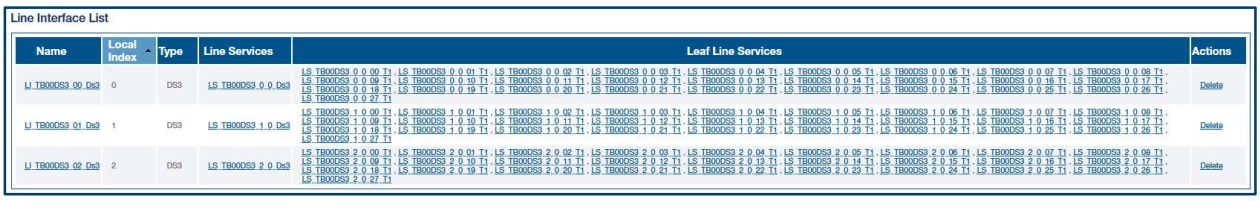


Figure 4-17 DS3 Completed Configuration

4.4 TDM Configuration – STM-1 Unit

4.4.1 Line Interface – STM1

In our product models the SONET/SDH interface is referred to simply as “STM-1” but it can be configured as an STM-1 or an OC3 line. As you can see in *Figure 4-3* and *Figure 4-4* there are many varying ways of configuring this Interface. In the demonstration of this document we will show a SONET OC3 Line Interface configured with three STS-1 Child Line Services each STS-1 will contain a DS3 Line Service which in turn will contain twenty-eight T1 Leaf Line Services. So our path will look like this:

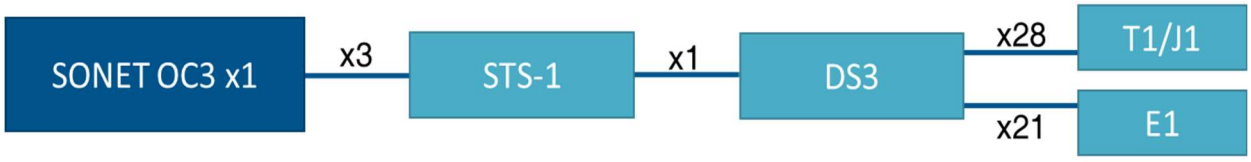


Figure 4-18 OC3.DS3 Configuration

Since there is only one OC3 per Hardware Unit we can begin here as we did previously by navigating to ‘**TDM Line Interfaces**’ but this time there is no need for Multiple Line Interfaces so we can simply select ‘**Create New Line Interface**’.

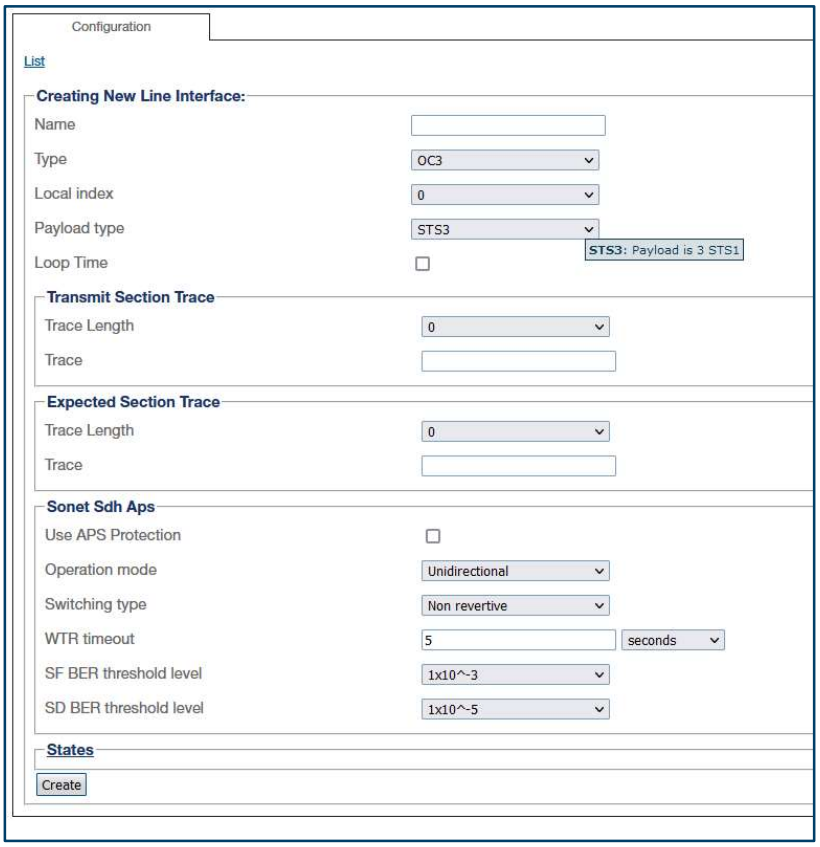


Figure 4-19 OC3 Line Interface

As we can see in the Figure above there is an extra section at the bottom to configure "Automatic Protection Switching" or APS. The settings are in the Line Interface only and once it is configured here the entire STM-1 or OC3 will be protected without further configuration needed on lower Line Services. The type in this demonstration is set to 'STS3' which (as explained by the tooltip) means 3xSTS-1's, my index is at 0 and only 0 since I have only one physical TDM Line to configure. Finally, I have **Loop Time** disabled *(Not the default)*. When Loop Time is enabled, the clock signal received on this line will also be used to transmit. When disabled, the clock signal of the main unit is used in transmissions.

Once we have configured the Line Interface it is time to make our Child Line Services in section 4.4.2.

4.4.2 Line Service – STM1

Once we have configured our **Line Interface** the WebGUI will bring us back to the **TDM Line Interfaces** page, we will click on the **Line Interface** we just made where we are presented with it's configuration and in the top left we have two links to create Line Services. Since we need three STS-1 Line Services we should click '**Create Multiple Child Line Services**'.

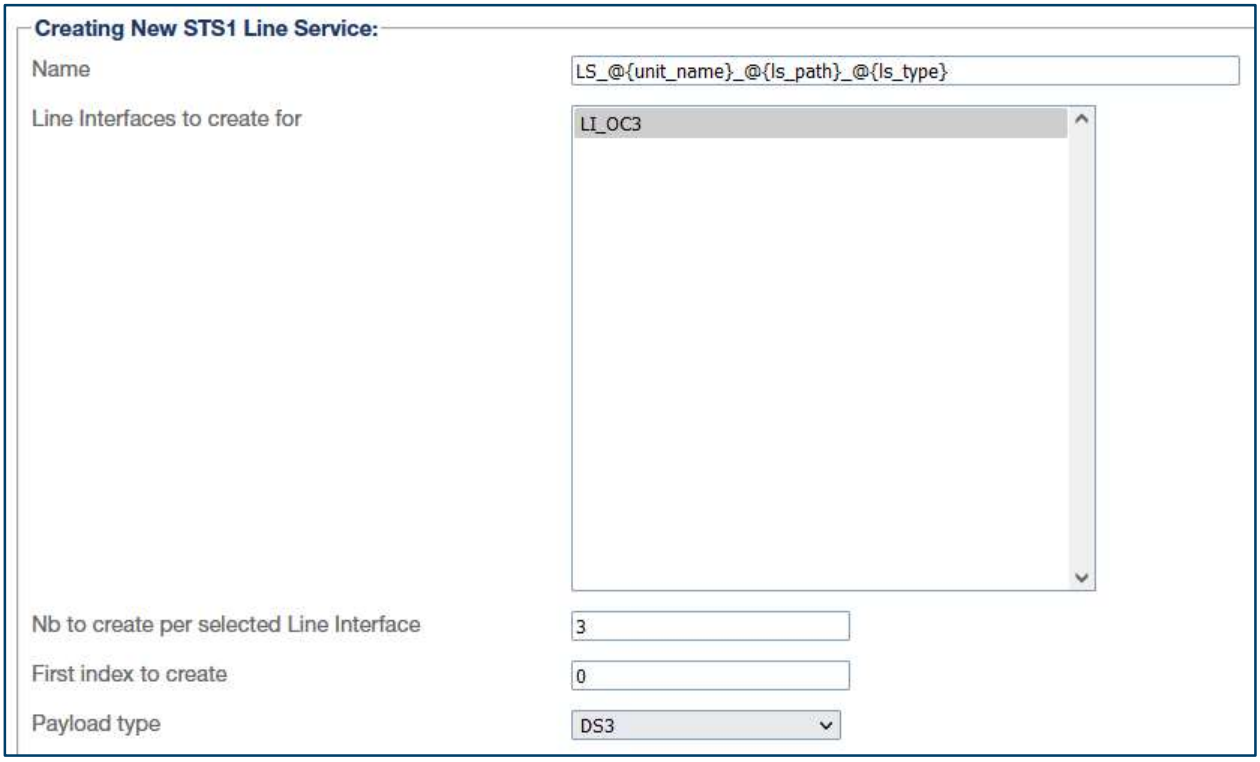


Figure 4-20 STS-1 Line Service

The name and variables are the same as explained in Section 4.2.1, our '**Nb to create per selected Line Interface**' will be 3, and our '**Payload type**' will be DS3, since that is our next Line Service Needed *(Reference Figure 4-18)*. Once created the WebGUI will return us to our **Line Interface** where we need to select one of the newly created STS-1 **Line Services** at the

bottom of the page. Once we have done that we can once again click the familiar '**Create Multiple Child Line Services**' and begin our DS3 Line Services.

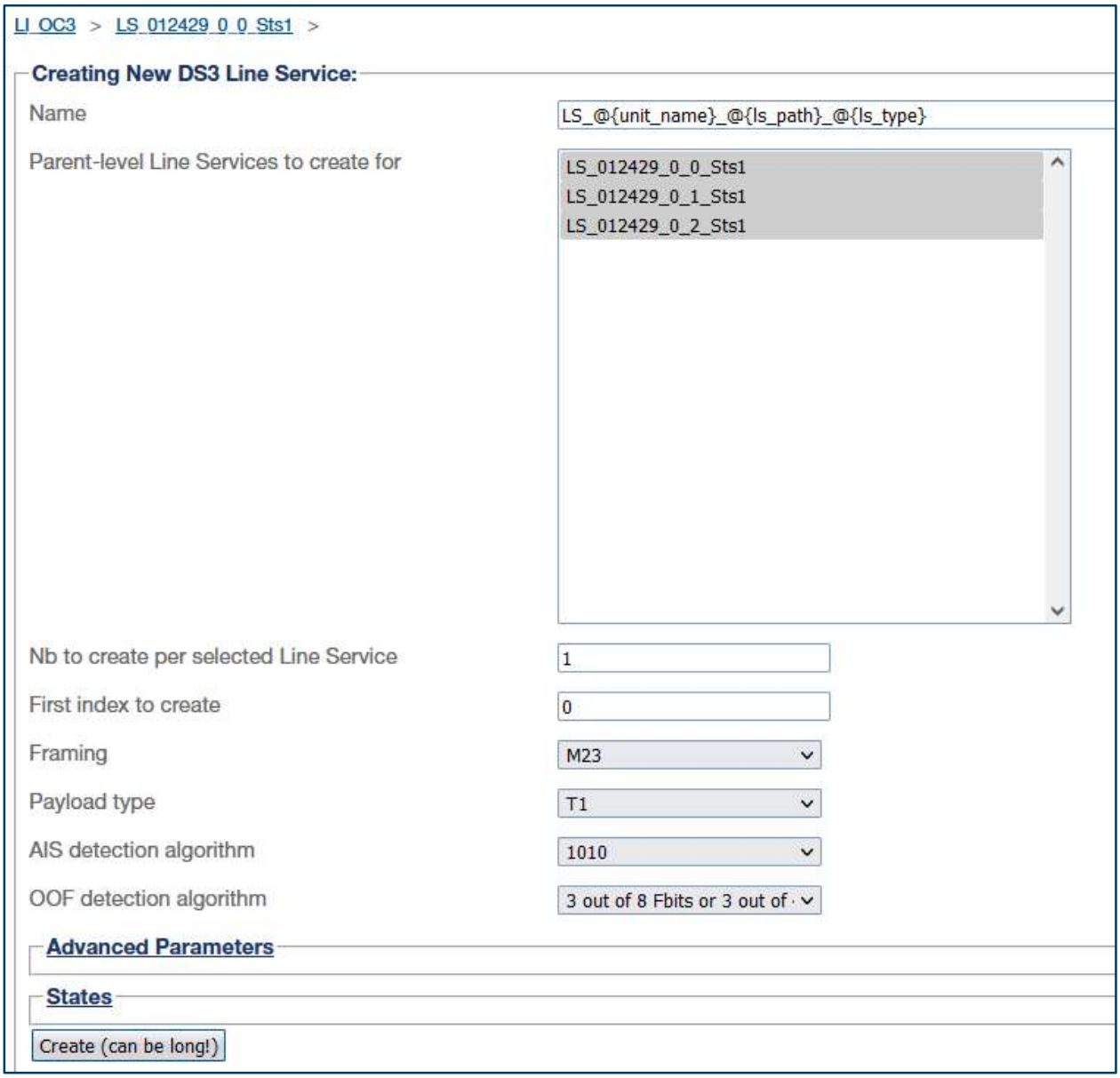


Figure 4-21 Create DS3 Line Services

Here we want to ensure we select all three STS-1 Line Services, leave the index at zero, and the number to be created **per selected Line Service** at one. This will create the three DS3s we need, one per STS-1 Line Service.

Once again we will navigate to one of the **Line Services** we have just created and select '**Create Multiple Child Line Services**' for the final **Leaf Line Service** that will define our T1s and our Framing. Once again our '**First index to create**' will be zero, but this time our '**Nb to create per selected Line Service**' will be 28 *(21 if using E1s)*.

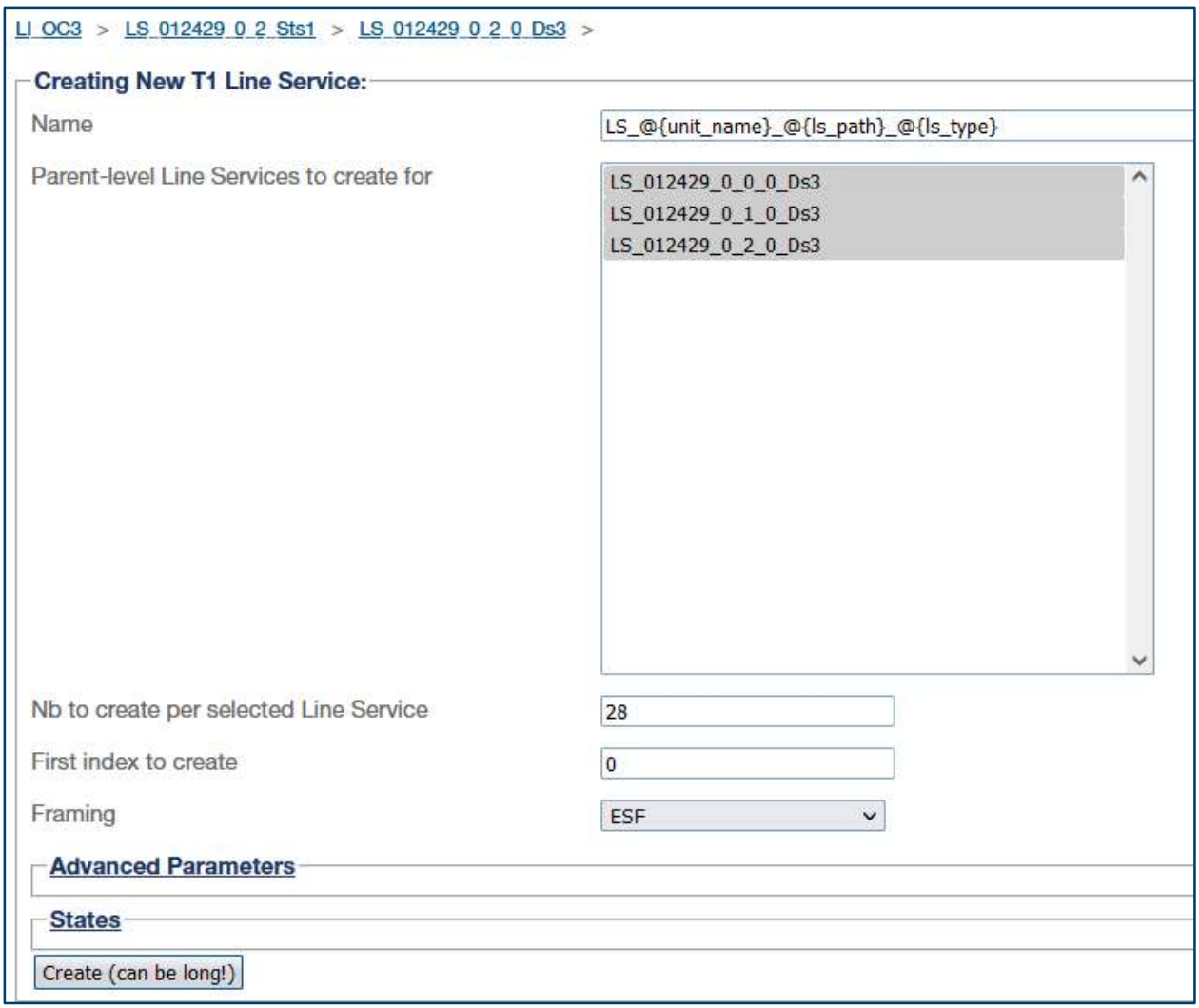


Figure 4-22 T1 Leaf Line Service on an OC3

After everything is correct we can click '**Create (can be long!)**' and let the system finish our OC3 Configuration.

Once the system finishes creating all of your T1s Navigate to the '**TDM Line Interfaces**' page once more and confirm all **Leaf Line Services** have been created correctly.

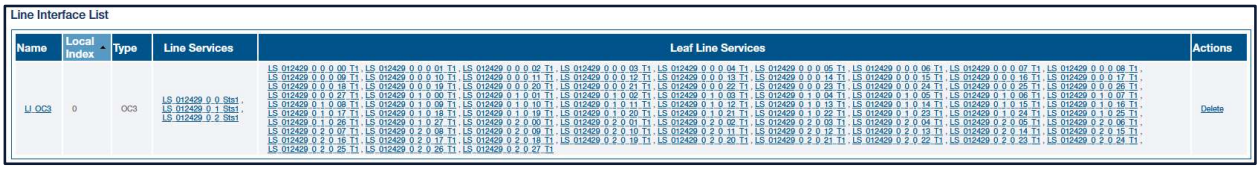


Figure 4-23 Completed OC3 Configuration

4.5 Clocking

On the Navigation Pane on the left you will see a link simply called '**Clocking**', this refers to the Clocking Sources for the TDM Lines. Tmedia devices are equipped with an internal oscillator and will use this if no Clocking Sources are configured. However, it is recommended that you utilize an external TDM Circuit to gather the most precise clock available. Both our DS3 and our STM-1 Units come with two RJ48C BITS ports, to configure those locate '**BITS Clock Interfaces**' just below TDM Line Interfaces on the Navigation Pane, the configuration will mirror the Line Interface on the TE Device *(shown in Section 4.2.1 Line Interface – TE).*

Once at the Clocking Page there will be an empty table, a few recovery settings, and at the top left is the link we want '**Create New External System Clock Reference**'. Once there you will need to select your '**Clock Ref Type**' which can be SONET/SDH, a specific **Line Service**, or a configured BITS Port. The latter two options will provide you with a dropdown to select one *(at a time, create additional External Clocks if you need more than one)* Line Service or BITS port that has already been configured. If you select '**Sonet SDH**' it will not ask you to select anything as it will use the singular STM-1/OC3 envelope for the timing.

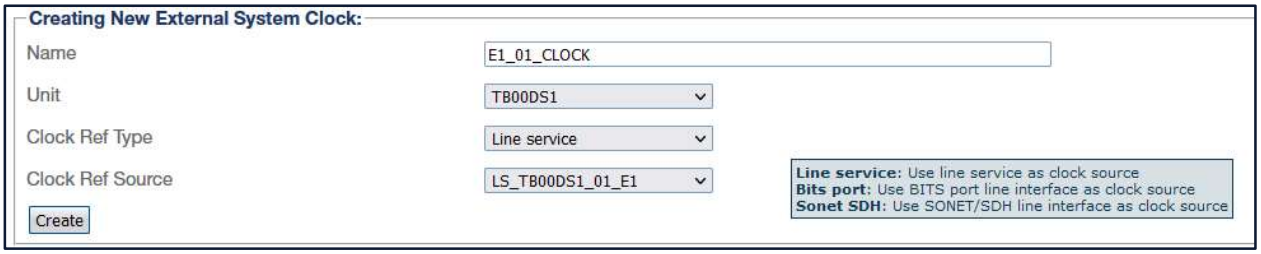


Figure 4-24 Create New External Clock

If you add multiple external clocking sources the main page will present you with a table with up and down arrows to adjust your Clocking Priority as desired.



Figure 4-25 External System Clocking Priority

5. Use Case 1: TSG

This section will instruct you how to set up MTP2 to M2UA Relay on a TSG or TMG. If you need to set up both Use Cases please begin with this one and then proceed to Section 6.

5.1 IP Interfaces

As mentioned in *Section 3.4 Management and Ethernet Ports* Physical Ports and VLANs are configured prior to the IP Interfaces and the Service Selection. If you have not configured those yet please refer to that section and do so now. This section will instruct you on adding SIGTRAN service to an IP Interface.

5.1.1 SIGTRAN IP Interface

Once your Physical Ports and your Virtual Ports are configured you are ready to create an IP Interface for your SIGTRAN Signalling. It should be noted that due to the division of labour between the **Host** and the **Hardware Unit** some services are incompatible with one another. The SIGTRAN Service is handled by the **Hardware Unit** so it can share services along with **SIP** and **RTP**, but not with H.248, RADIUS, or Management services. Multiple (compatible) services can be selected by holding down 'ctrl' as you select the services in the GUI.

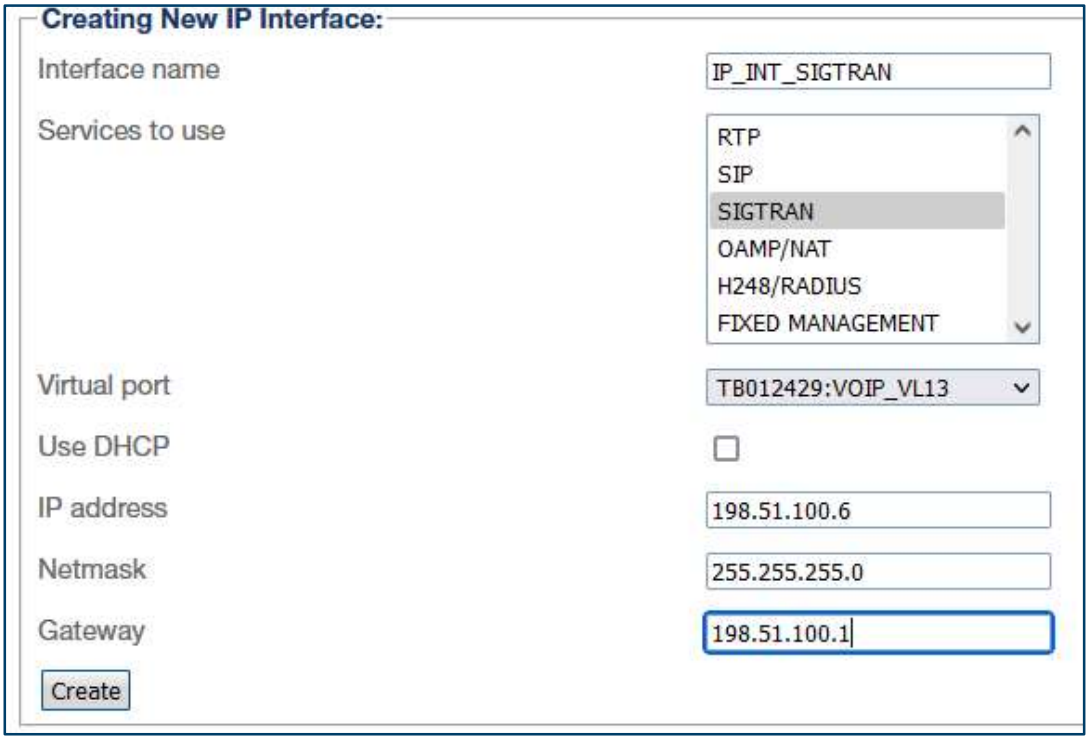


Figure 5-1 SIGTRAN IP Interface

Reference the example in the Figure above for configuration parameters.

5.2 TDM Interfaces

Setting up the Physical TDM Lines is addressed in Section 4, please refer to that section and continue on when completed.

5.3 MTP2 Configuration

Below the TDM Line Interfaces link in the Navigation Pane you will see a section labelled 'TDM Signalling' with a link below for '**MTP2**'. This will immediately bring you to '**Creating New MTP2 Config**' screen which is a logical container for the MTP2 Configuration. This can be named anything but please ensure that the '**Enabled**' check box is checked and click Create.



Figure 5-2 Create MTP2 Config

Once you've created the config you will see a new link to '**Create New MTP2 Link**' to begin the link creation.

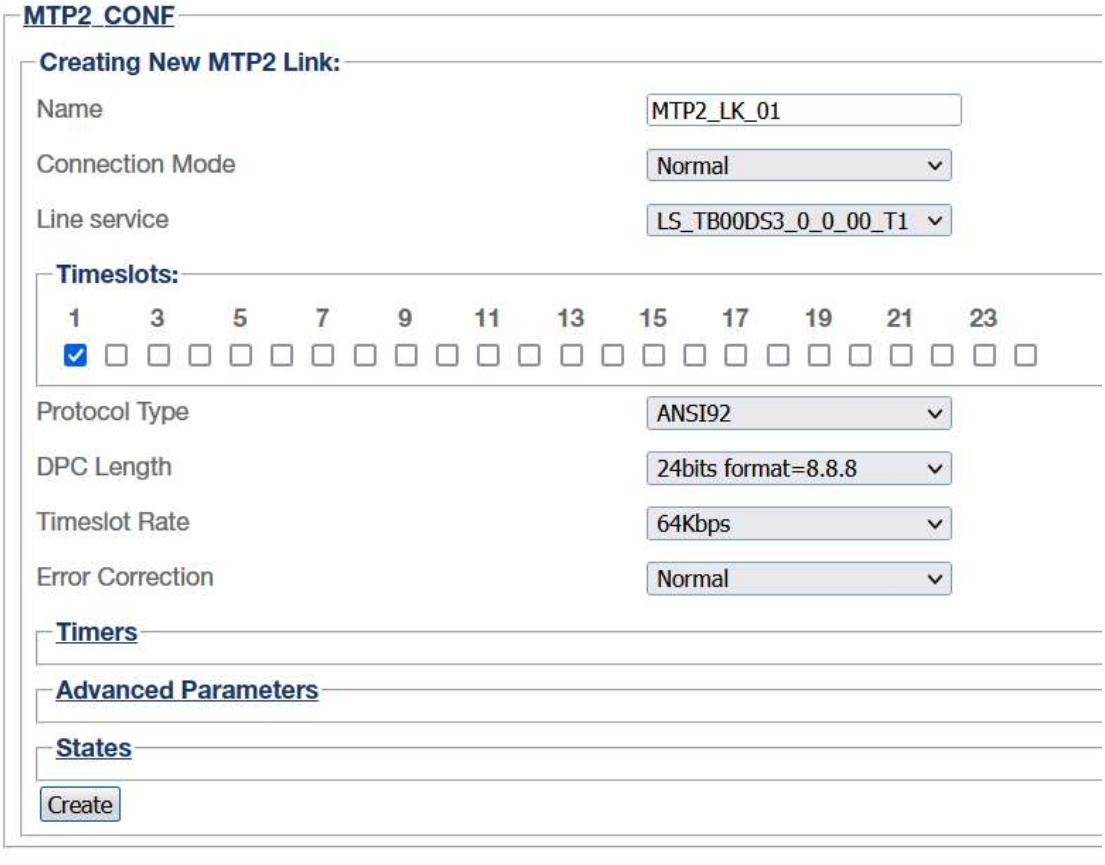


Figure 5-3 Create an MTP2 Link

The '**Name**' is fully customizable, the '**Connection Mode**' should be left at *Normal* unless you need to use all Timeslots on this T1, in which case you should change it to *HSL* (High Speed Link). The dropdown menu for '**Line Service**' allows you to select which T1/E1 this MTP2 Link is to be configured on, immediately followed by the '**Timeslots:**' checkboxes allowing you to select which DS0 the signalling is coming on.

Protocol Type and **DPC Length** should match your environment's configuration but in nearly all cases a T1 will use **ANSI92** with **24bits format=8.8.8** while an E1 will use **ITU92** and **14bits format=3.8.3** respectively.

Repeat these steps as necessary to create all needed MTP2 Links, navigating back to the '**MTP2**' page *(The user is automatically redirected upon saving a MTP2 Link)* will allow you to see a table of your MTP2 Links, and at this stage the only thing that should be missing is the **Bound Link** which will be configured in the next section after we create our **M2UA Links**.

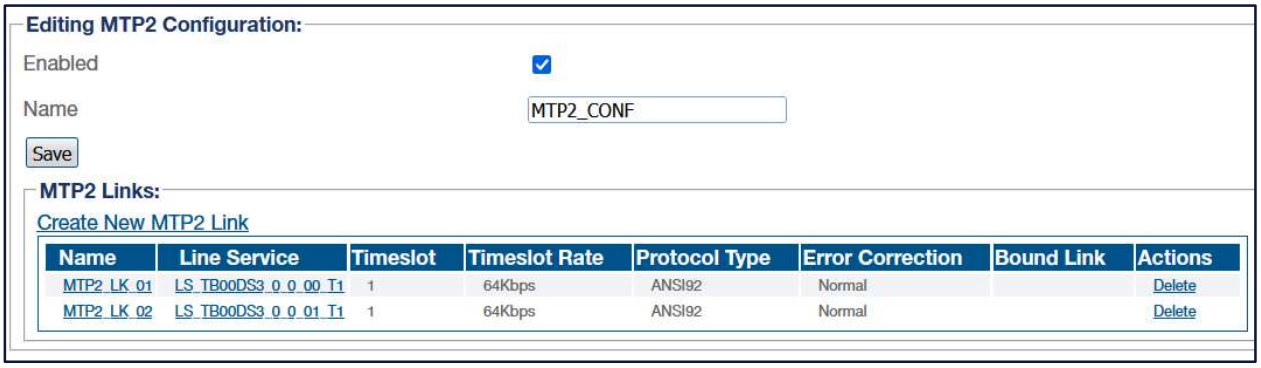


Figure 5-4 Two Completed MTP2 Links

5.4 M2UA Configuration

We are now looking under the *Sigtran* subsection of the Navigation Pane, and we need to select '**SCTP**' first as it is the transport protocol used by M2UA *(and other SIGTRAN protocols)*. Like the MTP2 Configuration in the previous Section we have very little to configure here.

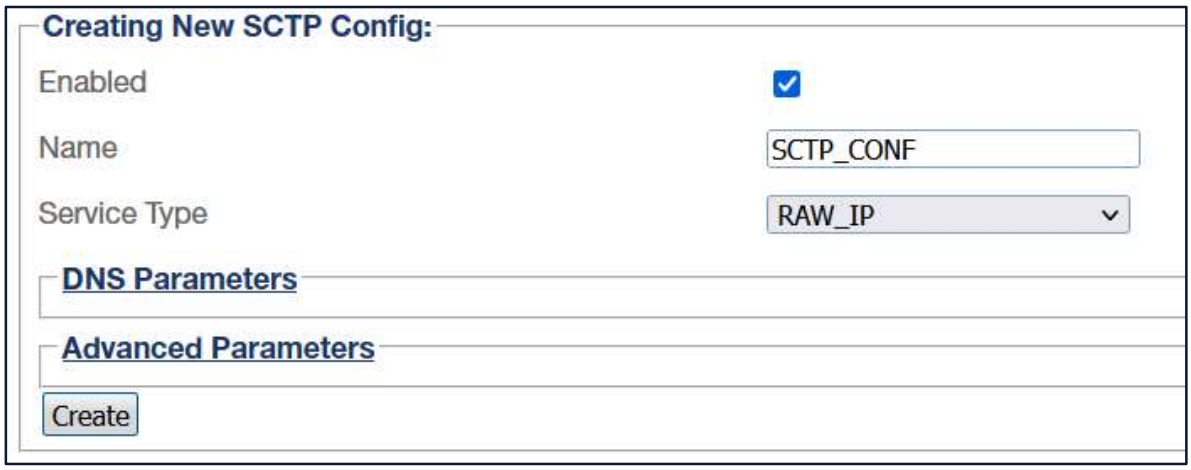


Figure 5-5 SCTP Configuration

Since SCTP is a transport protocol like UDP and TCP it is best to leave the **Service Type** at **RAW_IP** unless there is absolute certainty the environment requires UDP Tunnelling. Once we save that we have nothing more to configure with SCTP and are ready to make our way to the '**M2UA**' page from the Navigation Pane. There we will once again be asked to create a logical container for our M2UA Links.

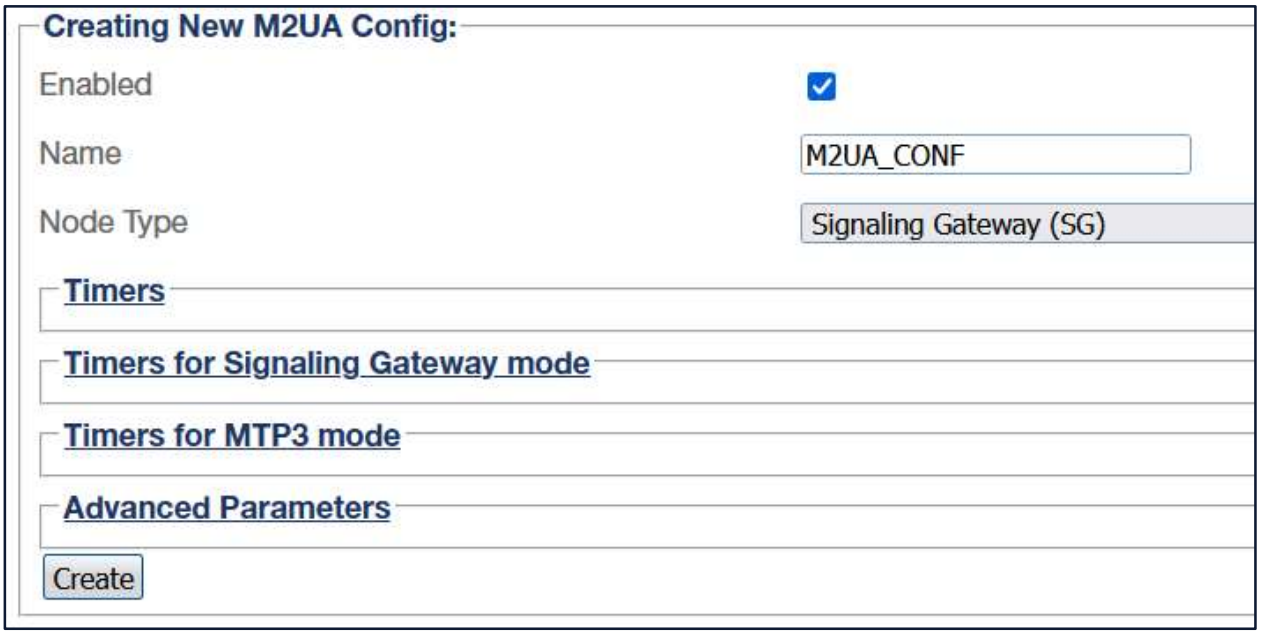


Figure 5-6 M2UA Configuration

Once again ensure **Enabled** is checked, give it a custom **Name**, and for our Use Case of MTP2 to M2UA Relay we should leave the **Node Type** as **Signalling Gateway (SG)**. The timers should be left as-is except in very specific high-latency networks *(like satellite communication).* Once we click 'Create' a new link will appear below the Create button that has now turned into a **Save** button. Click on '**Create New M2UA SAP**' and once again give it a custom **Name**.

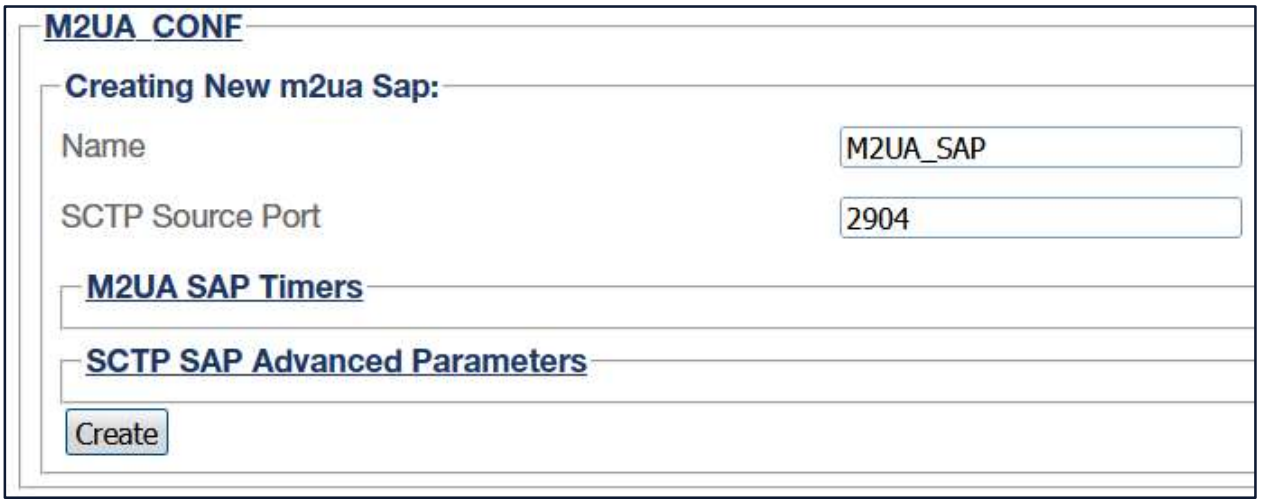


Figure 5-7 Create M2UA SAP

Here is where we set the **Source Port** for our M2UA SIGTRAN communication. By default it will be prefilled to **2904** the default port for this protocol, which can be left the same in nearly all cases. Within the SAP we will need to assign the IP Interface we made in Section *5.1.1.*

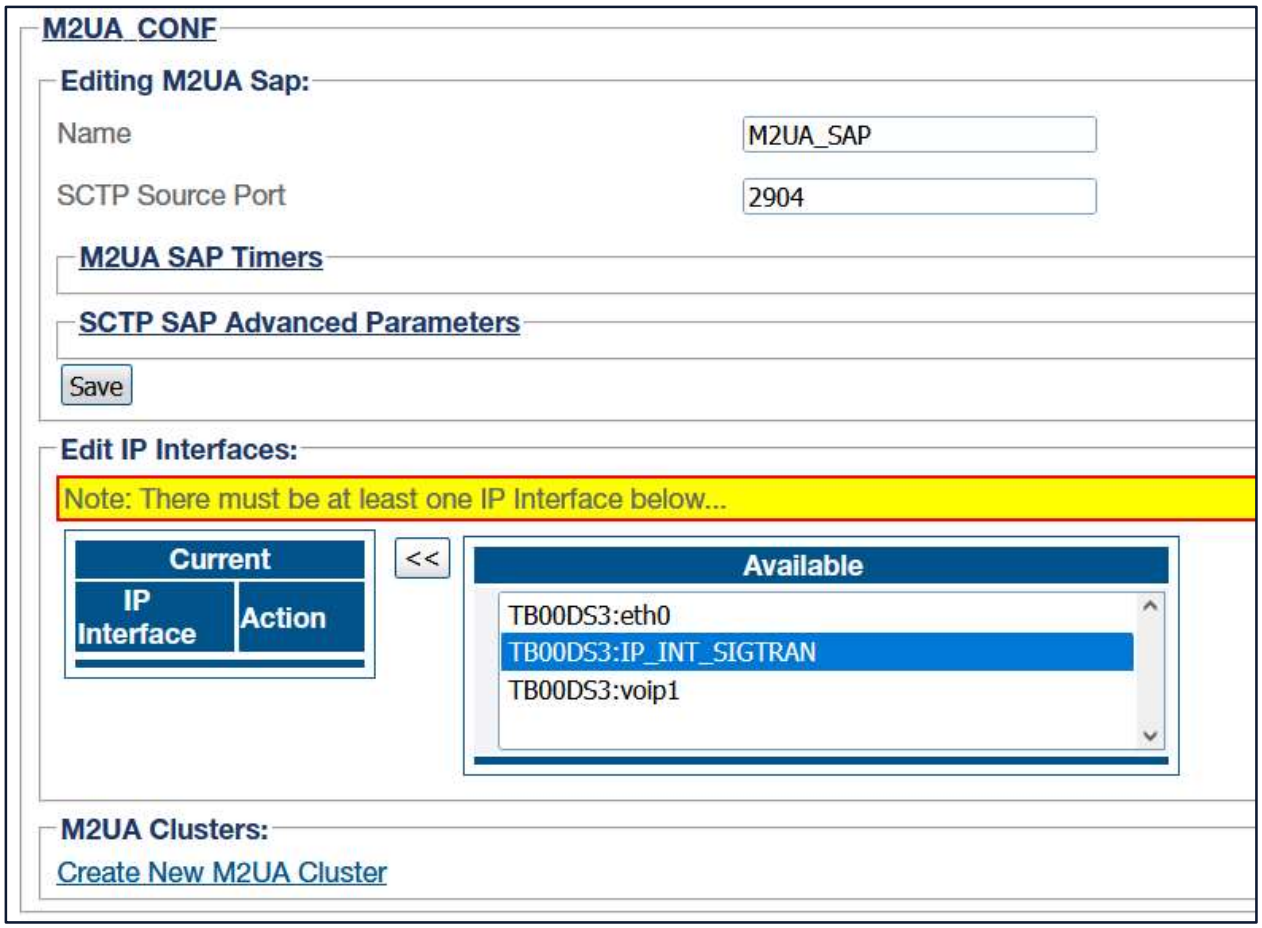


Figure 5-8 Adding IP Interface to M2UA SAP

We add the interface by selecting it *(as shown above)* and selecting the two arrows in between the two tables. After that we can create our M2UA Cluster by clicking the link shown at the very bottom of *Figure 5-8* '**Create New M2UA Cluster**'.

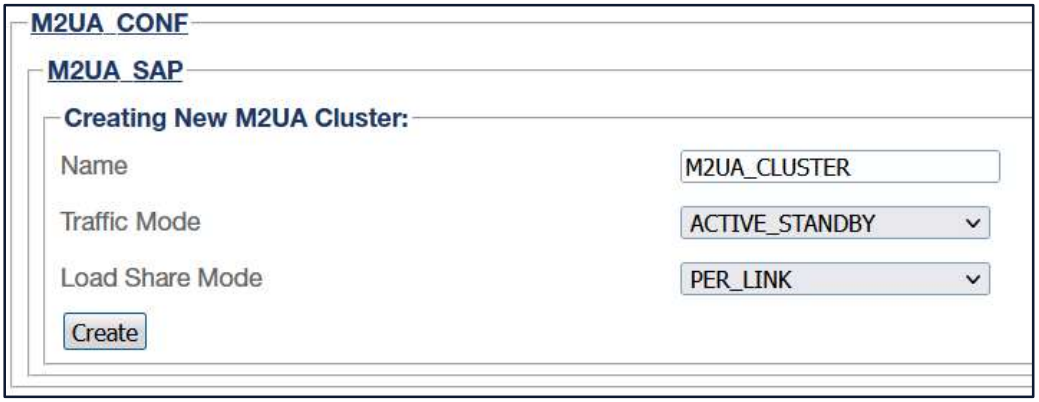


Figure 5-9 Create a M2UA Cluster

As before write in a custom **Name**, then in **Traffic Mode** select how device should handle multiple links within the same cluster. Should it keep them in Active/Standby *(as is the default)* or should it be changed to do load sharing. If **Traffic Mode** is set to **LOADSHARE** then the Load Share Mode should be configured between a Per-Link basis or Round-Robin. *Note: If the **Traffic Mode** is ACTIVE_STANDBY then the **Load Share Mode** setting has no effect.* Finally click create so the links will be available for the last two configuration parameters we need.

5.4.1 Create New M2UA Link

Here is where we will at last configure our individual M2UA links and bind them to the MTP2 Links created in the previous section.

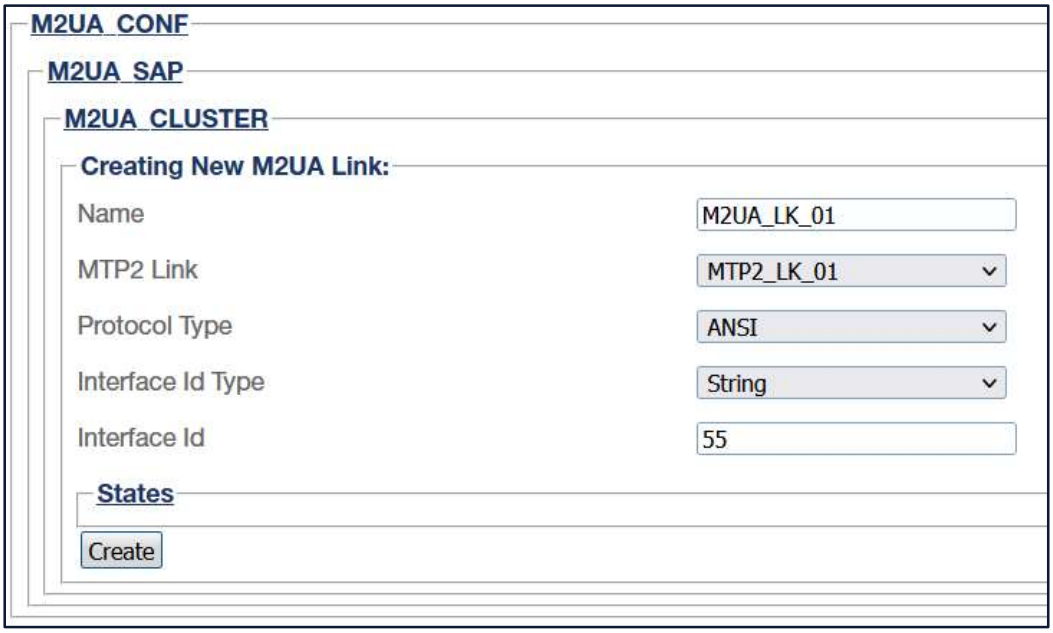


Figure 5-10 Create M2UA Link

The first three settings are rather simple, a custom **Name**, the bound **MTP2 Link**, and the **Protocol Type** *(once again almost certainly ANSI for T1 and ITU for E1)*. The last two settings must be matched specifically with the M2UA Peer.

Interface ID Type: This switches between 'Integer' and 'String' and can vary depending on the Switch being connected to, but in a **Metaswitch** environment the type should be set to **'String'**. *(Warning: String is not the default)*

Interface ID: This is the management ID that the **Metaswitch** will use to identify the proper signalling line. This ID **MUST** be an exact match within the Metaswitch Configuration. To ensure that this value is correct please verify in the MetaView Explorer that the "**M2UA identifier**" on the Metaswitch is set to the same as the **'Interface Id**' on the Tmedia Device. See the figures below for further clarification.

Refer to *Appendix C – MetaView Explorer* for examples of the CFS configured to receive the M2UA links from the Tmedia device, and as verified both the **Interface Id** in *Figure 5-10 Create M2UA Link* and the **M2UA identifier** in *Figure C - 8 MVE M2UA Link Identifier* are an exact match. If these do not match the Metaswitch will be unable to utilize the signalling links. Repeat these steps for each M2UA Link needed and verify the configuration once back at the '**M2UA Cluster**' page.

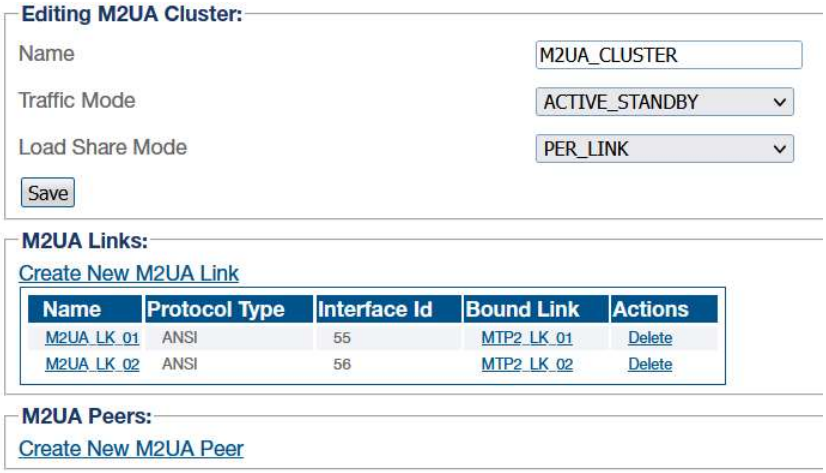


Figure 5-11 M2UA Cluster Links Completed

5.4.2 Create new M2UA Peer

Our final step is creating the Peer Association in the Tmedia device so that it knows which server to send the M2UA traffic to. We will do that by clicking on the '**Create New M2UA Peer**' link at the bottom of the **M2UA Cluster** page *(shown in Figure 5-11)*

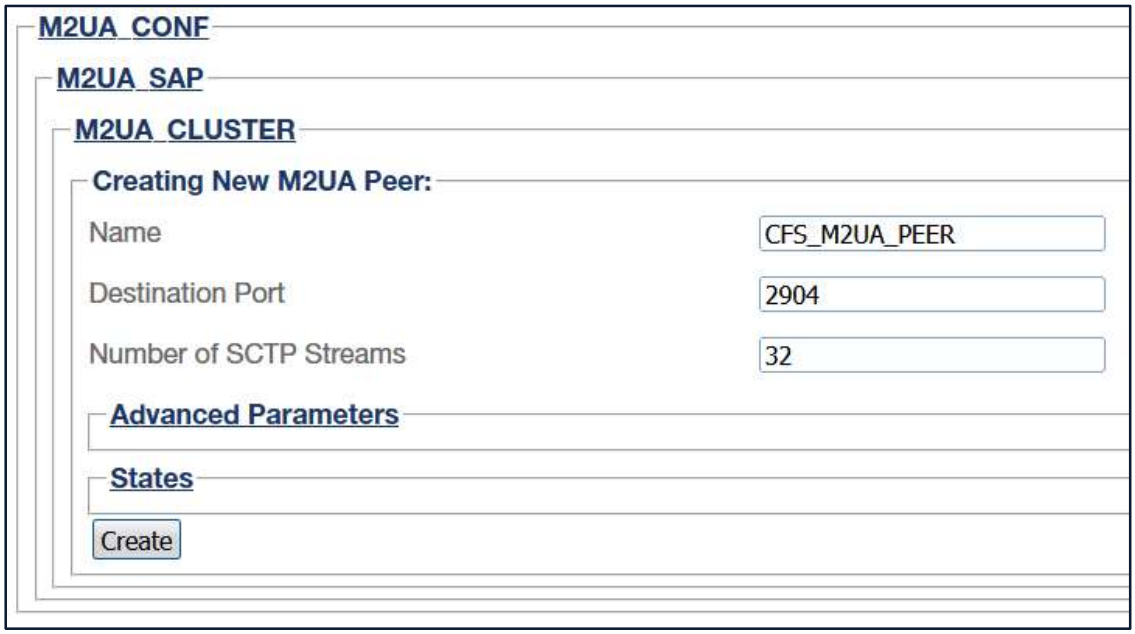


Figure 5-12 Create M2UA Peer

Add a custom **Name**, generally keep the **Destination Port** at default, and the **Number of SCTP Streams** also can be left at default as the **Metaswitch** will override the default configuration during setup negotiation if needed. Once we click '**Create**' the button will turn into a '**Save**' button and there will be a new field below to add a **Destination Address** for the M2UA Server.

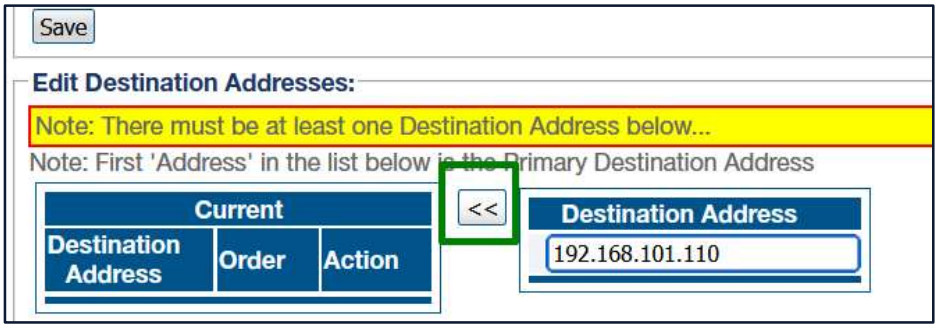


Figure 5-13 Add M2UA Peer Destination Address

Manually type in the IP Address of the M2UA Peer and click the two arrows outlined in green.

Congratulations! The Tmedia device is now set up as a TSG Signalling Gateway and will relay MTP2 to M2UA and vice versa! Remember to go to '**System**' and Activate your Config!

6. Use Case 2: TMG

6.1 IP Interfaces

As mentioned in *Section 3.4 Management and Ethernet Ports* Physical Ports and VLANs are configured prior to the IP Interfaces and the Service Selection. If they are not configured yet please refer to that section and do so now. In this section we will explain how to create assign H.248 and RTP services to an IP Interface.

6.1.1 H.248 Interface

Once our Virtual Ports *(Section 3.4.2)* are configured we are ready to create an IP Interface for H.248, remember since the **host** controls the H.248 Configuration this IP Interface can not be used with other Services *(such as RTP)*, they **can** exist on the same Virtual Port though, and they **can** exist in the same subnet. In the Navigation Pane under Hardware Units we will click on the "**IP Interfaces**" link and on top of that table we will click '**Create New IP Interface**' and fill in our IP Information, remembering to select the proper Virtual Port from the drop down and selecting H248/RADIUS in the '**Service to use**' menu.

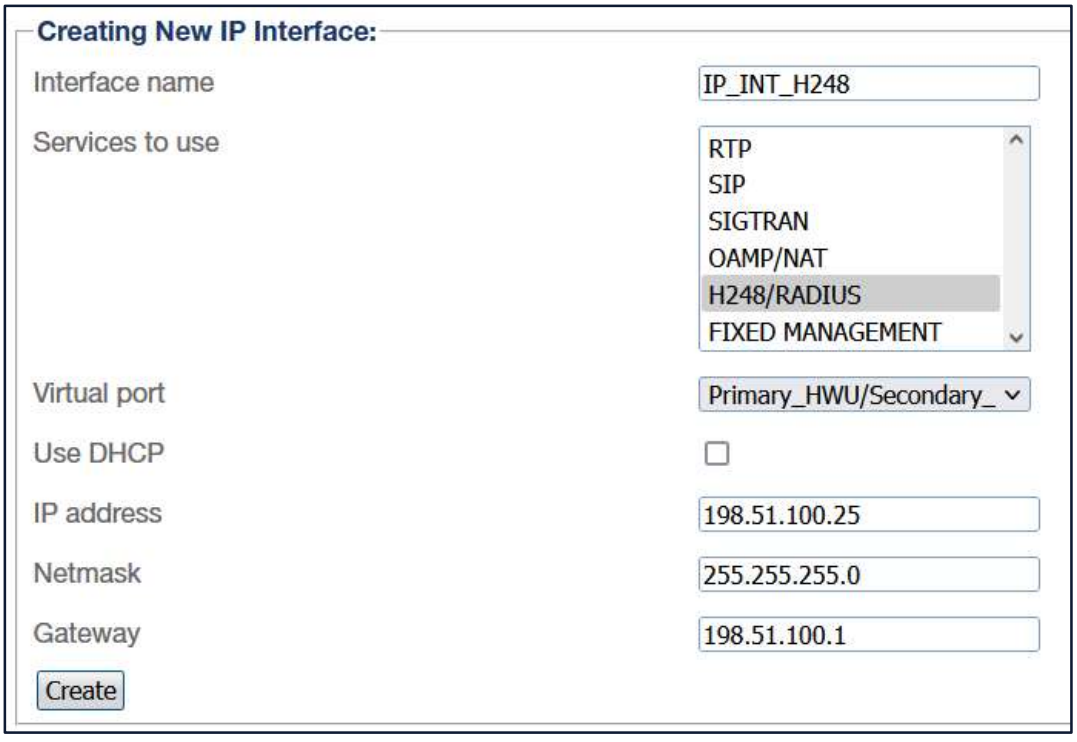


Figure 6-1 H.248 IP Interface

Once everything is filled in click '**Create**' and the H.248 IP Interface is done.

6.1.2 RTP Interface

Creating the RTP Interface follows the same procedures as the H.248 though it should be noted that if the Tmedia device is being setup for both Use Cases outlined in *Section 1.1* it **is** possible to configure RTP and SIGTRAN Services on the same IP Interfaces by selecting both with 'Ctrl+Click' despite the example below only showing RTP.

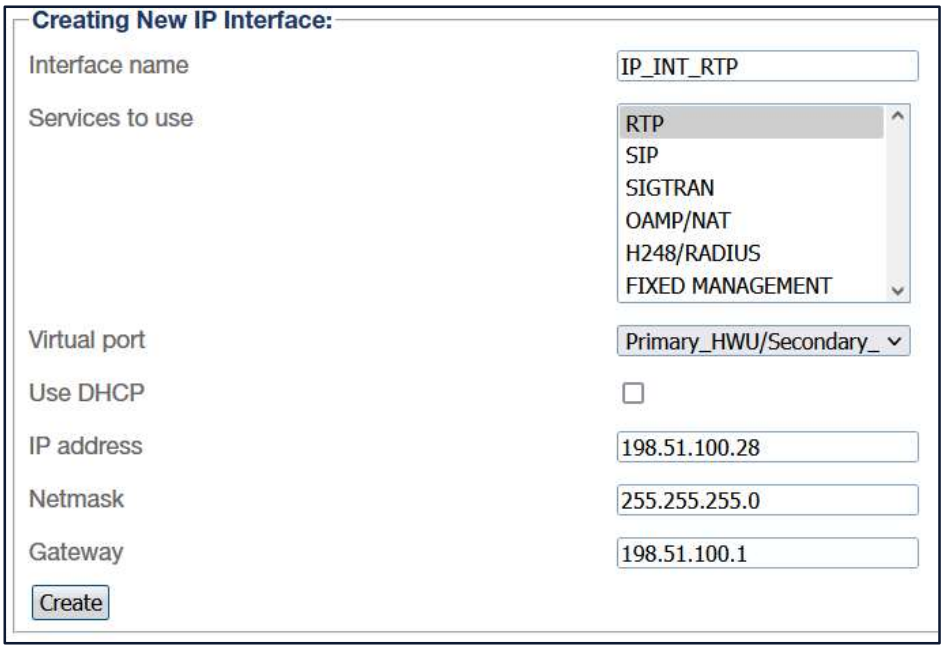


Figure 6-2 Create RTP IP Interface

Once we click '**Create**' the interface will be created a long with an automatically configured '**RTP Port Range**'. To view or modify the RTP Port Range used select the tab '**RTP Port Ranges**' at the top of the **IP Interfaces** table as shown below.

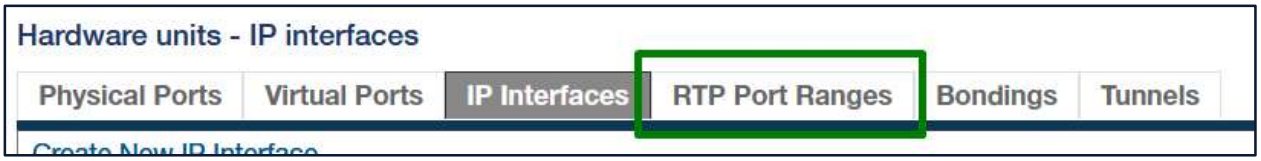


Figure 6-3 RTP Port Ranges Selection

Then there will be an option to click on the automatically created Port Range and modify the default range which is 20000 – 40000.

6.2 TDM Interfaces

Setting up the Physical TDM Lines is addressed in *Section 4,* please refer to that section and continue on when completed.

6.2.1 CAS and MF Trunks

The TMG Supports several variants of Multi-Frequency *(MF)* and Channel Associated Signalling *(CAS)* Trunks. To begin this, ensure your TDM Interfaces are properly setup and select “CAS” under the TDM Signalling subsection of the Navigation Pane. Once there select ‘Create New CAS Stack’, there will need to be a CAS Stack for each E1/T1 on the unit that is using CAS or MF.

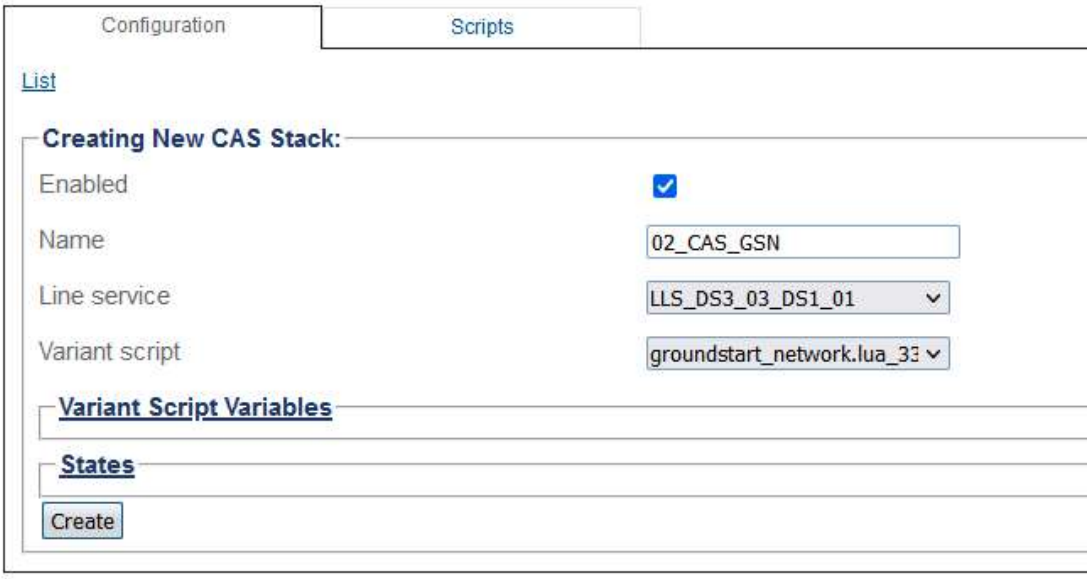


Figure 6-4 Creating a New CAS Stack

There you have four mandatory fields, and additional fields for modifying the CAS event behaviour and the states of a time slot. The four mandatory fields are:

Enabled: A bullion specifying whether this trunk is active.

Name: A cosmetic name for referencing the CAS Stack.

Line Service: The TDM Line Service that this trunk will operate on.

Variant script: This script file defines the behaviour and parameters of the CAS line in LUA format and can be read or accessed by the end user from the ‘Scripts’ tab at the top of the figure above. (See *Appendix F – CASR1 and MF Variants*)

The Variant script is what needs to be changed to select the different variants of CAS, such as E&M, Loopstart, or Groundstart. For Metaswitch installations it is advised to use the highest revision number of each script in cases where there are multiple revisions. Once a CAS Stack has been created and bound to a Line Service for each trunk you are ready to continue.

6.3 PRI Configuration

Setting up PRI Configuration will vary based on the type of ISDN lines needed. If you are setting up NI2, 5ESS, DMS, or other CCS *(Common Channel Signalling)* protocols you will need to

setup an **IUA Relay** for each T1/E1 to ensure that the MGC *(Media Gateway Controller)* is able to receive the signalling needed. If your PRI Lines are to be configured using ISUP/SS7 which can operate in a Quasi-Associated Signalling *(QAS)* you may not need any additional configuration.

6.3.1 IUA Configuration

ISDN User Adaption or IUA is a protocol for sending ISDN Q.921 User messages over IP. Like the M2UA Configuration in *Section 5 Use Case 1: TSG* we must begin with creating a SIGTRAN IP Interface *(explained in Section 5.1.1 SIGTRAN IP Interface)* and an SCTP Configuration. If you have already done this you can skip this step and move directly onto the IUA Config creation.

Under the *Sigtran* subsection of the Navigation Pane, and we need to select '**SCTP**' first as it is the transport protocol used by IUA *(and other SIGTRAN protocols)*.

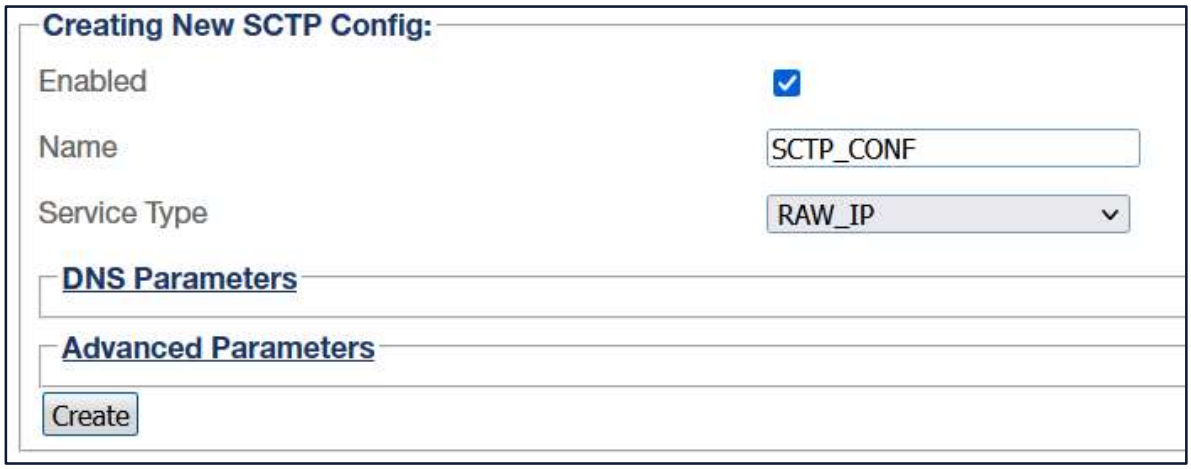


Figure 6-5 Create SCTP Configuration

Since SCTP is a transport protocol like UDP and TCP it is best to leave the **Service Type** at **RAW_IP** unless there is absolute certainty the environment requires UDP Tunnelling. After the SCTP Configuration is completed navigate below that to '**IUA**' where there is a nearly identical screen to create an '**IUA Config**'



Figure 6-6 Create an IUA Configuration

Give the IUA config a name, ensure the **Enabled** box is checked and click '**Create**' which will refresh the page with a new link at the bottom to '**Create a New IUA Sap**' where the SCTP Source Port for IUA is configured.

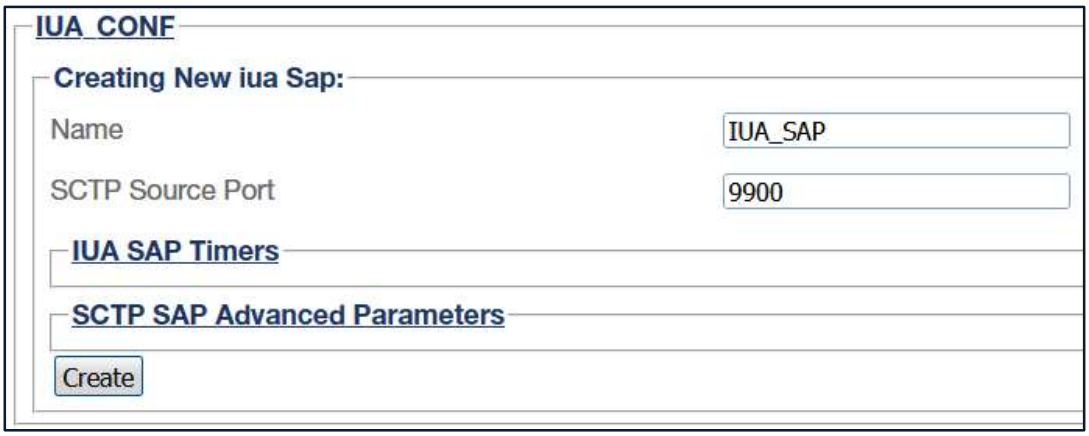


Figure 6-7 Create IUA SAP

This source port is for the Tmedia Devices' own port, and should be matched in the **Metaswitch** configuration object "ISDN SCTP Association" where an IP and Port of the Media Gateway is needed. Click '**Create**' and the option to select an IP Interface *(Must be configured for the SIGTRAN service)* will appear.

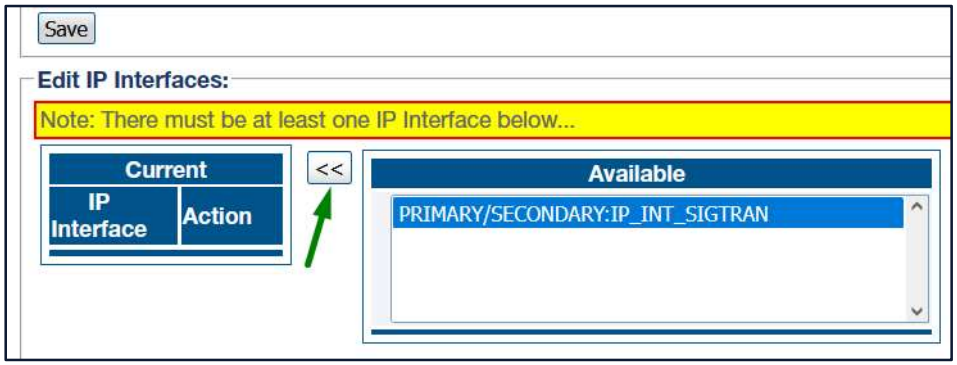


Figure 6-8 IUA IP Interface

Select the proper interface and click the two arrows to bind it. Once completed look below this table and click on the link '**Create New IUA Cluster**' to be brought to a configuration page that matches the M2UA Cluster from previous sections. Choose the appropriate **Traffic** and **Load Share** modes *(explained just below Figure 5-9 Create a M2UA Cluster)* and click '**Create**'.

There will be three links that appear below, '**Create New IUA Link**', '**Create Multiple IUA Links**', and '**Create New IUA Peer**'. Before creating IUA Links *(one or multiple)* we should first ensure that we know the **Interface ID,** as this value must match perfectly in the **Metaswitch** Configuration or the links will not function. If the Interface ID's are consecutive you can use the link to **Create Multiple** but if they are not you will need to make the Links one at a time.

To ensure what the **Interface ID**s are set to open **MetaView Explorer** and navigate on the Object Tree to **ISDN Primary Rate Interfaces** examples are shown in *Appendix C – MetaView Explorer.*

On the right-hand side of **MVE** the PRI Attributes are listed, you want to ensure that '**Configured primary D-channel IUA / SCTP identifier**' matches the '**Interface ID**' exactly. The Index of the PRI on the **Metaswitch** does **not** matter. This is shown in Figure *C - 10 Configured primary D-channel IUA / SCTP identifier*.

Once the **Interface ID** is double checked, navigate to the **IUA Cluster** previously created and click on '**Create Multiple IUA Links**' *(assuming the Interface IDs are consecutive, otherwise they will need to be created one at a time.)*

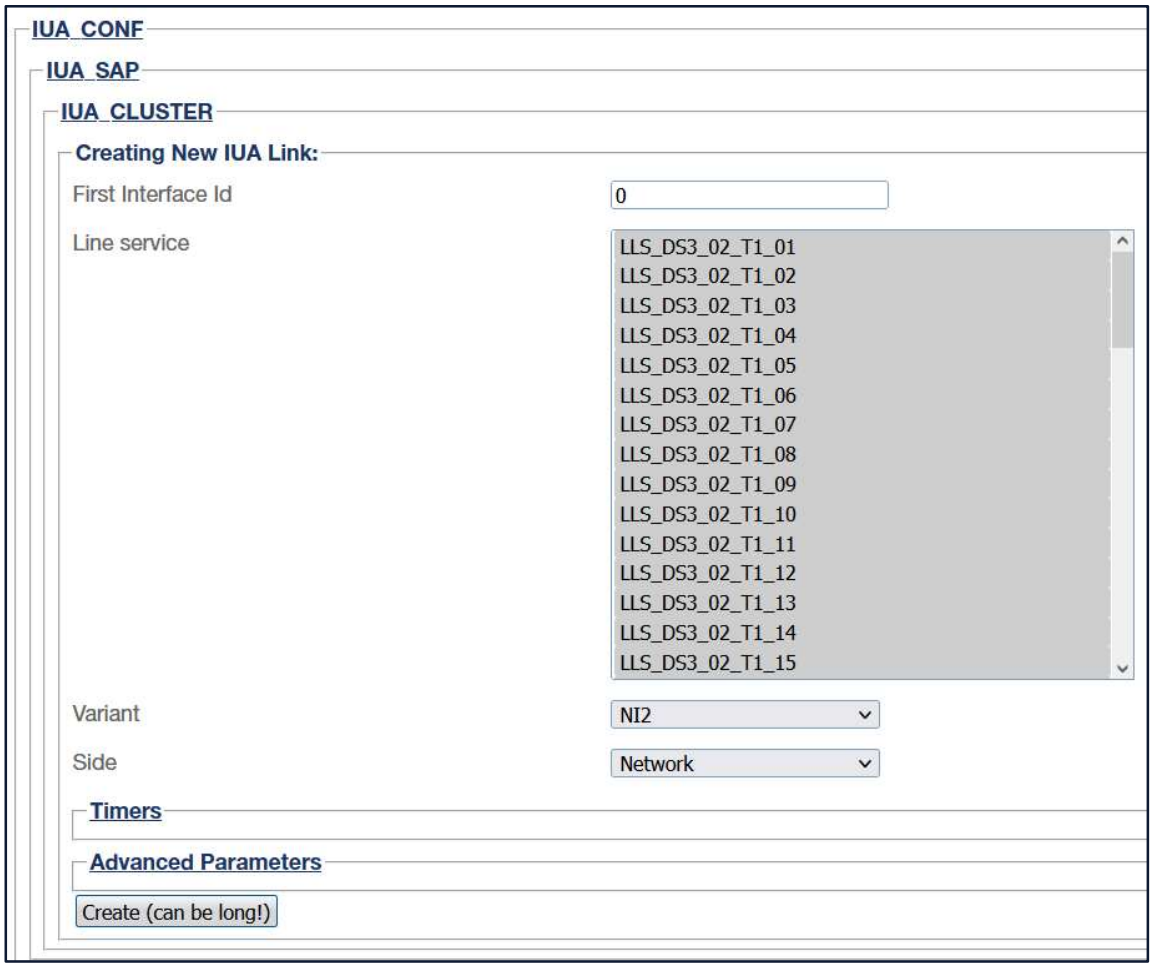


Figure 6-9 Create Multiple IUA Links

The name of each IUA Link will be automatically generated and the Interface ID will begin at the '**First Interface Id**' provided and count up by one for each **Line Service**. Select the appropriate T1/E1s in the **Line Service** menu using 'Ctrl+Click' or 'Shift+Click' and assign the **First Interface ID**. Set the proper Variant and Side *(Network/User side is from the Point of View of the **Metaswitch**)* and click '**Create (can be long!)**'.

After landing back at **IUA Cluster** page please ensure all settings are correct. *Note: Double check the **side** of each IUA Link as the WebGUI sometimes reverts to the default value of 'User' when creating multiple IUA Links at once.*

After verifying all of the IUA Link Configuration is correct click on the link at the bottom labelled '**Create New IUA Peer**'



Figure 6-10 IUA Peer Link

A custom **Name** and the **Destination Port** (IUA / SCTP Port on the Metaswitch) are all that need to be configured initially.

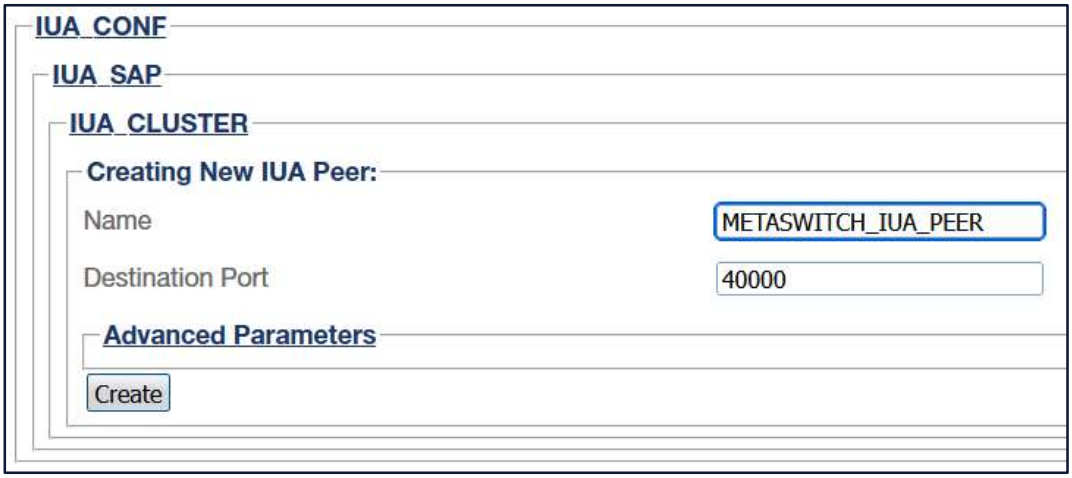


Figure 6-11 Creating New IUA Peer

The **Metaswitch** will always use port 40000 for IUA / SCTP configuration, so ensure that you change the default value from 9900 to **40000** and click '**Create**' to reveal the field to add the **Metaswitch** IP Address as your IUA Peer.



Figure 6-12 Add Destination Address to IUA Peer

Enter the proper IP Address and click the two arrows to add it to the configuration and the IUA Configuration is complete!

6.4 SS7 CICs

SS7 CICs *(Channel Identification Code)* is the term used for the Timeslots of an SS7 Trunk that carry Voice and Media. If your setup requires SS7 Signalling and Media please complete

Section 5 Use Case 1: TSG before continuing with this section. If your environment does not have signalling links than you should Proceed with setting up your Voice Profiles in the next section. CIC and Timeslot assignment are discussed in *Section 6.6.2 TDM NAP*.

6.5 Voice Profiles

Voice Profiles are used to customize a variety of specific parameters such as: CODECs used in an RTP stream, RTCP settings, Call Progress Tones, Fax/Modem detection with T.38 Parameters, among many other things. It is recommended to copy the default profile with a new name before making changes if necessitated by the environment.



Figure 6-13 Copying Default Profile with a New Name

The Figure above shows a user copying the default profile to new profile named '**Metaswitch_Profile**' though as in most places before this name is customizable. Once it is created clicking on the new profile name will bring you to the profile specific configuration.

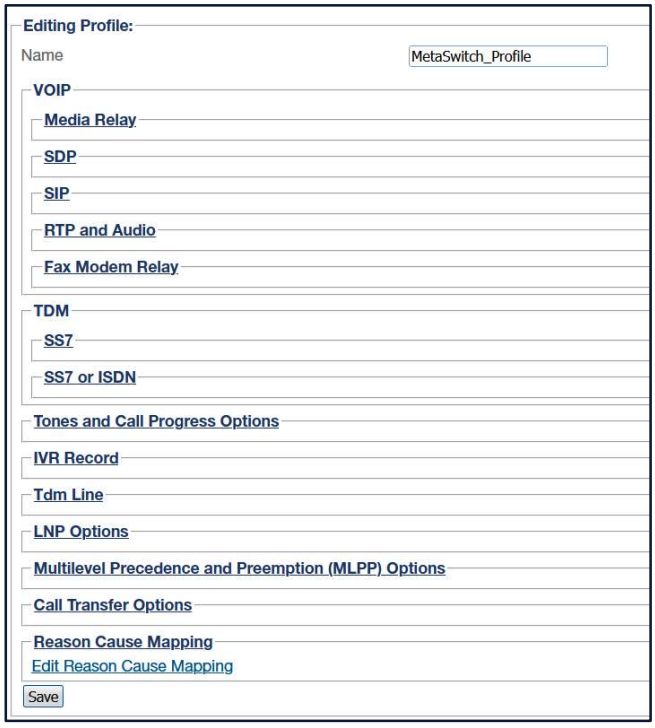


Figure 6-14 Profile Settings

In the '**SDP**' drop down you will see how the Tmedia device will generate local SDP and which CODECs are selected. By default the Tmedia device will advertise it supports PCMA/PCMU, G.723.1, and G.729AB. The default SDP profile is:

```
m=audio 0 RTP/AVP 0 8 4 18 101 13 9
a=rtpmap:101 telephone-event/8000
a=fmtp:101 0-15,32-36
```

For detailed instructions on how to configure the SDP to your desired values please refer to:
https://docs.telcobridges.com/Toolpack:Profile_SDP_Description

6.6 NAP Creation

A Network Access Point (*NAP)* is a logical egress or ingress point in the Tmedia, in a non-H.248 configuration each NAP would be to a different fixed peer and the Tmedia would refer to it's own internal routing tables to decide when to use each one. However, since in our configuration the Tmedia device is a Media Gateway *(MG)* slave to the **Metaswitch**' s Media Gateway Controller *(MGC)* we only need two NAPs, one for *ephemeral terminations* and one for *fixed terminations*.

6.6.1 RTP NAP

Navigate to '**NAPs**' on the Navigation Pane where an empty table will be shown with a link above that says '**Create New NAP**'; click that link, enter a custom **Name** for your NAP and select the proper profile *(if one other than default was configured in the previous section).*

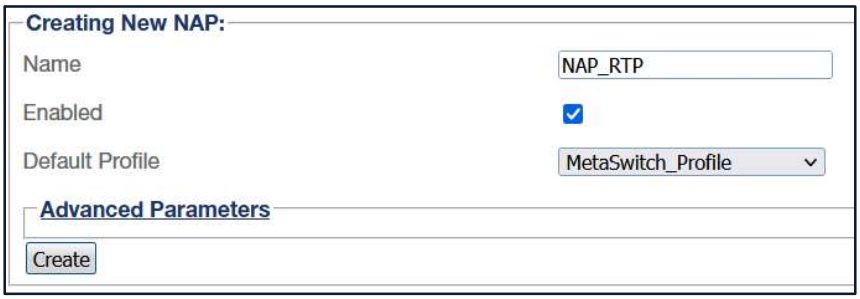


Figure 6-15 RTP NAP Creation

After clicking '**Create**' there will be many tables with options to add logical terminations, but for an H.248 setup we are only interested in the tables that say '**media only**'. For the RTP NAP we will need to add the RTP Port Range that was automatically configured in *Section 6.1.2*.

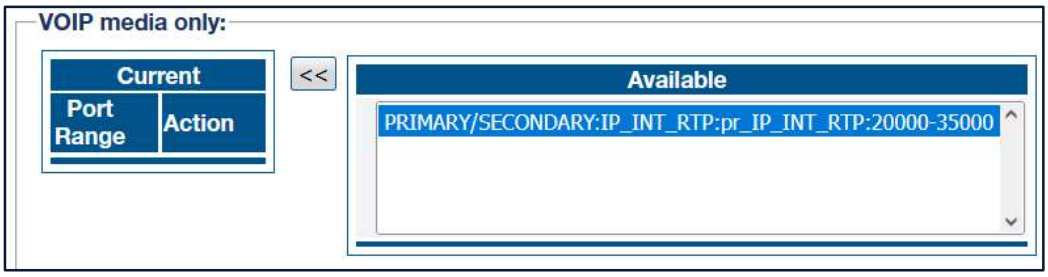


Figure 6-16 Add VOIP media only to NAP

Once again, select the desired object and click the double arrows to apply it to the configuration.

6.6.2 TDM NAP

Following the same procedure as the RTP NAP, navigate back to the '**NAPs**' page and click '**Create New NAP**', give it custom **Name** and select the desired **profile** before clicking '**Create**'.

Once again scroll down to find the proper table to add our T1/E1s (**Line Services**).

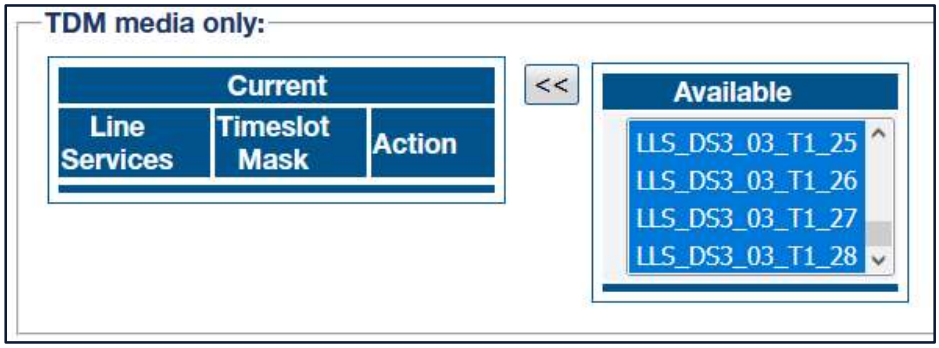


Figure 6-17 Add TDM media only to NAP

Select all available TDM Line Services using 'Shift+Click' and then carry them over once again with the double arrows. Once the page refreshes, we will see all of our Line Services in the NAP with a Timeslot Mask immediately adjacent.

The Timeslot Mask is a hexadecimal number specifying which channels MGC is able to send media on. If a T1/E1 is an SS7 CIC with all timeslots used for media it should read: **0xffffff.** If it is configured as a T1/ISDN using IUA relay you would expect all but the 24th Timeslot (the D-Channel) to be available which would show as **0x7fffff**. If it is an SS7 CIC with MTP2 configured on the first Timeslot it should show **0xfffffe**. It is important you complete any IUA/MTP2 configuration needed before this step so that the Line Service on the **NAP** is provisioned correctly.

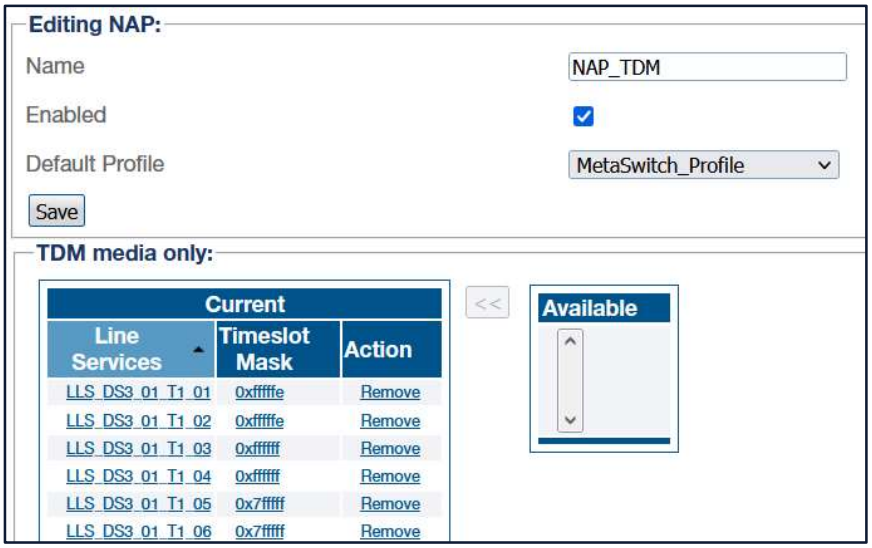


Figure 6-18 NAP Timeslot Mask Example

In the example above we have our first two T1/E1s configured as SS7 CICs with the first timeslot of each carrying MTP2 Traffic to relay via M2UA, our second two T1/E1s are fulling configured as SS7 CICs using all 24 timeslots in the T1, and finally the last two are configured as NI2 T1s with the 24th Timeslot taking signalling to be relayed over IUA to the **Metaswitch**.

6.6.3 CAS NAP

This section applies to all Channel Associated Signalling:

- PBX Subscriber Lines
- Individual Line Access Devices with CASR1
- Multi-Frequency (MF) Trunking

Following the same procedures as an RTP or TDM NAP, navigate to the 'NAPs' page and click '**Create New NAP'**, give it a custom Name and select the desired profile before clicking '**Create'**. Once again scroll down to find the proper table to add the CAS Stacks created in *Section 6.2.1*.

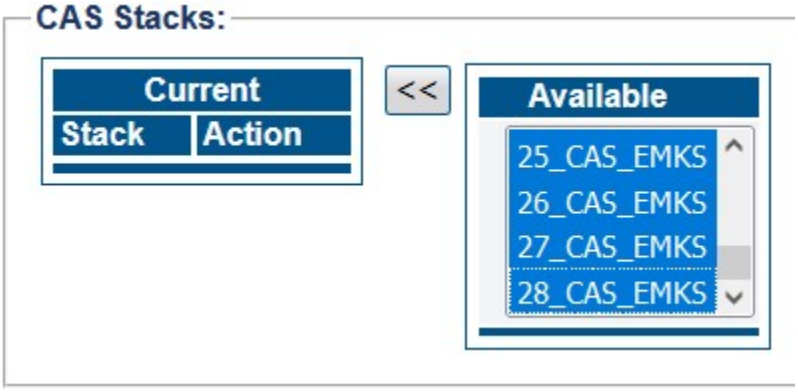


Figure 6-19 Add CAS Stacks to NAP

Select all available CAS Stacks using 'Shift+Click' and then carry them over once again with the double arrows. Once the page refreshes, all of the CAS Stacks will be included in this NAP.

The Timeslot Mask is not used here as all channels will be available with signalling on each channel.

6.7 H.248/MEGACO Configuration

H.248 (or MEGACO) is a media gateway control protocol architecture to allow a Media Gateway Controller (MGC) to utilize the controlled Media Gateway (MG) dynamically. It allows the **Metaswitch** to make all routing and signalling decisions while using the specialized Hardware of the Tmedia to handle the Voice and Media traffic.

6.7.1 MGC Configuration

Metaswitch has created, verified, and certified a '**Remote Media Gateway Model**' *(RMGM)* for the Tmedia devices which is attached to this document as an appendices but also can be downloaded here: https://docs.telcobridges.com/placeholder/tmg_rmgm.txt

This file can be imported into the Metaswitch environment under '**Controlled Networks**' in the MVE. It is important to use to the correct RMGM to ensure undisrupted communication between the Tmedia device and the Metaswitch. Once your **Trunk / Access Gateway** is configured in the Metaswitch using the proper RMGM it is time configure the Tmedia Device. To begin navigate to '**H.248**' near the bottom of the Navigation Pane.

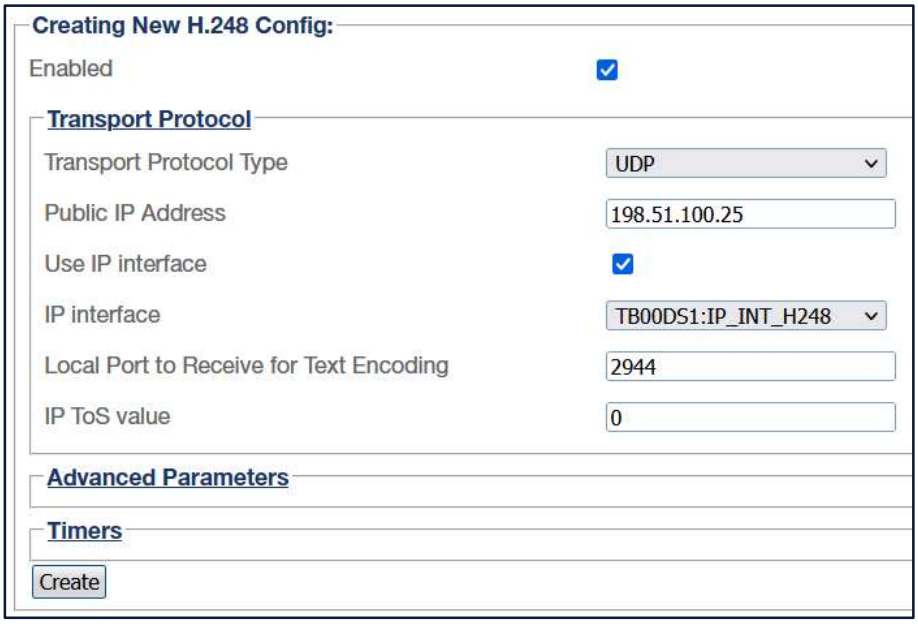


Figure 6-20 Creating a New H.248 Config

Make sure **Enabled** is checked, the Public IP Address is filled in with the value of the **Tmedia device** *Note: This should be the IP Address that the Metaswitch will see when communicating to the Tmedia Device. If your Metaswitch and Tmedia are local to one another a private IP Address may go here. It is* ***not*** *the IP Address of the MGC (Media Gateway Controller).*

Use IP Interface should be checked and below should be the Interface created in *Section 6.1.1*

Local Port left at 2944 *(in most cases)*

And click '**Create**'

Once the H.248 Config is created we will see additional configuration options below the '**Save**' button where we can add our MGC and our Terminations.

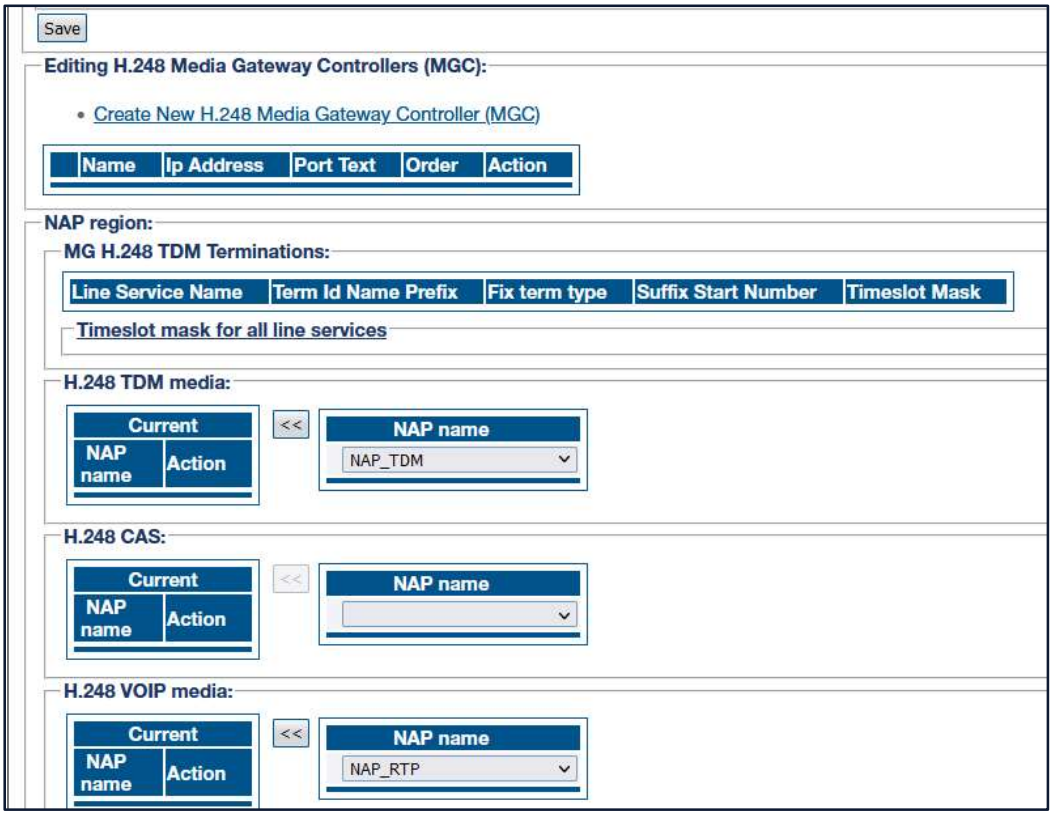


Figure 6-21 Empty H.248 Configuration

Click on the link '**Create new H.248 Media Gateway Controller (MGC)**' to add the **Metaswitch** to the Tmedia device.



Figure 6-22 Adding an MGC

Enter a custom **Name**, the **IP Address** of the **Metaswitch MGC** and the default port of 2944 and click '**Create**'.

6.7.2 Ephemeral Termination Name

An Ephemeral *(meaning temporary)* Termination is H.248 Terminology for the terminations on the IP Side. It is named as it is because the **RTP port range** is incredibly large and ports will open and close dynamically as the MGC and MG operate in their normal functionality.

At the very bottom of *Figure 6-21 Empty H.248 Configuration* we see the RTP NAP we created in *Section 6.6.1* next to an empty table labelled '**H.248 VOIP media**', by clicking the double arrows that we have seen before we can associate those RTP Ports with our H.248 Configuration. Effectively giving the MGC permission to use them at anytime. Once we have done that we need to ensure the '**Ephemeral Termination Identifier Root**' in the Tmedia device matches the '**RTP port – Port name'** in the Metaswitch MGC.

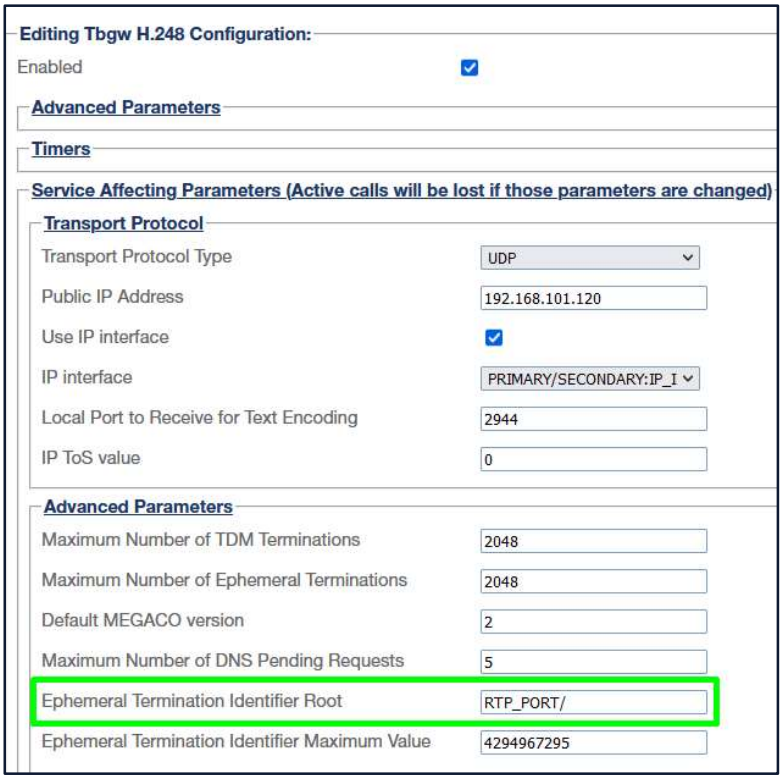


Figure 6-23 Ephemeral Termination Identifier Root

By clicking '**Advanced Parameters**' in the H.248 Configuration we will see an accordion menu expand revealing our '**Ephemeral Termination Identifier Root**' which can be changed to ensure it matches the Metaswitch MGC. Navigate to your '**Trunk / Access Gateway**' in the MetaView Explorer and check the name of the '**RTP Port**' as shown in *Figure C - 4 RTP Port Name.*

In the figures in subsection iii of *Appendix C – MetaView Explorer* we can see that the names are matched with the outlined section in *Figure 6-23* with the exception of the ending '*/*' in the Tmedia configuration. This slash is what separates the Ephemeral Termination prefix with the dynamic numerical value that will specify a specific RTP port as a specific Ephemeral Termination. In the Metaswitch this slash is defined in the field a bit below labelled '**Separator**

Character'. You will also note that this name is **not** case sensitive. Once the value in the Tmedia has been modified to match the Metaswitch configuration click '**Save**' and continue to the fixed terminations.

6.7.3 Fixed Termination Naming

Fixed Terminations refer to the TDM Terminations, each trunk*(T1/E1)* has a specific name and each timeslot*(DS0)* has a number assigned that does not change. To add the Fixed Terminations scroll down in the '**H.248**' configuration and add the TDM NAP *(configured in Section 6.6.2)* using the double arrows seen above. Once this is done the table named '**MG H.248 TDM Terminations:**' will automatically populate with all of the configured T1/E1s with a Termination Name Prefix of '**TRK_**[Line Service Name]**/**' and a Timeslot Mask of zero *(no DS0s).*



Figure 6-24 MG H.248 TDM Terminations Table

Clicking on the '**Line Service Name**' in that table brings us to a page where we can change the '**Term Id Name Prefix**' and configure **Timeslots** used by this Line. This prefix must exactly match the '**TDM Port – Port Name**' configured under the **Trunk / Access Gateway** in the Metaswitch as shown in the corresponding subsection in *Appendix C – MetaView Explorer.*

The **Line Service** name does not matter in this circumstance, only the '**Term Id Name Prefix**'

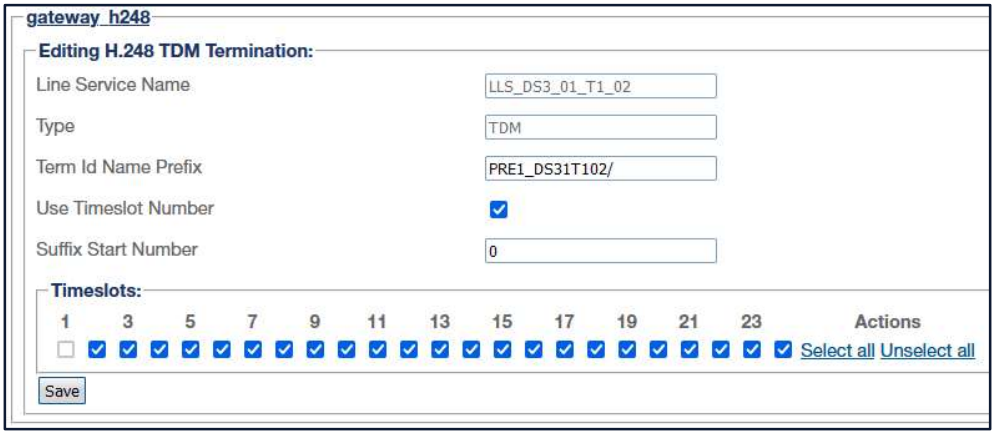


Figure 6-25 Editing H.248 TDM Termination

The Metaswitch uses the **Timeslot Number** directly so ensure that box is always checked. The '**Suffix Start Number**' will be ignored *(Because the 'Use Timeslot Number is enabled).*

'**Select all**' under **Timeslots: Actions**, which will configure all Timeslots available to the NAP. *(In this case Timeslot 1 is unselectable because it is an MTP2 Signalling Link, in a line where IUA is configured Timeslot 24 would be unselectable.)*

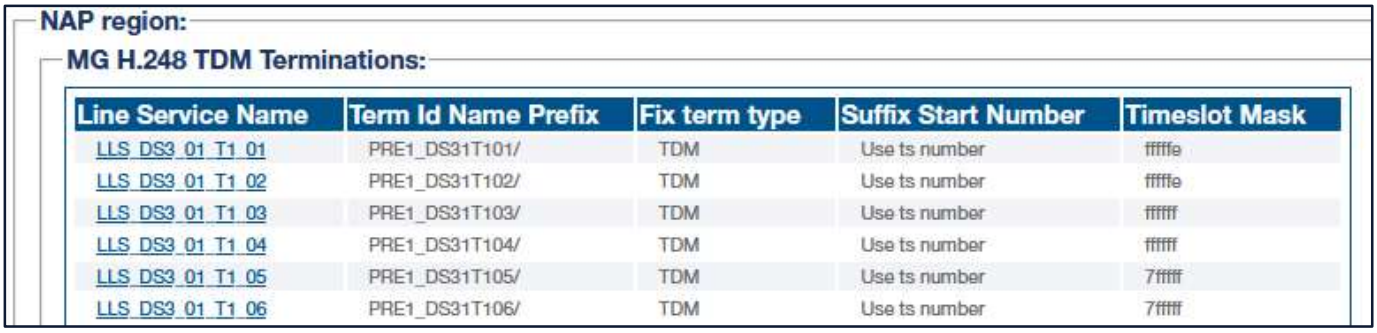


Figure 6-26 Six TDM Lines Fully Configured

Once that is done the H.248 Configuration is completed.

6.8 SAS Configuration

The **Metaswitch Service Assurance Server** (SAS) is a unique tool that captures detailed diagnostics for all calls, over all protocols, all the time. It is highly optimized for service provider workloads and it stores all that data more efficiently than general purpose database solutions. Our Media Gateway has the ability to send logs and messages to this server to make observation and troubleshooting easier. First ensure you have the proper licensing mentioned in *Section 2.4* and then navigate to '**Applications**' on the Navigation Pane.



Figure 6-27 Applications Table

Click on '**tbuctwriter**' *(TelcoBridges Unique Call Trace Writer)* to be brought to the configuration page of that application. Once there click on '**Application Parameters**' to expand the menu. There you will see three fields under the label '**Metaswitch SAS**', a check box to **enable** the communication, along with the SAS Server IP Address and Port. The default port for the SAS Server is **6761** as shown in the Figure below.

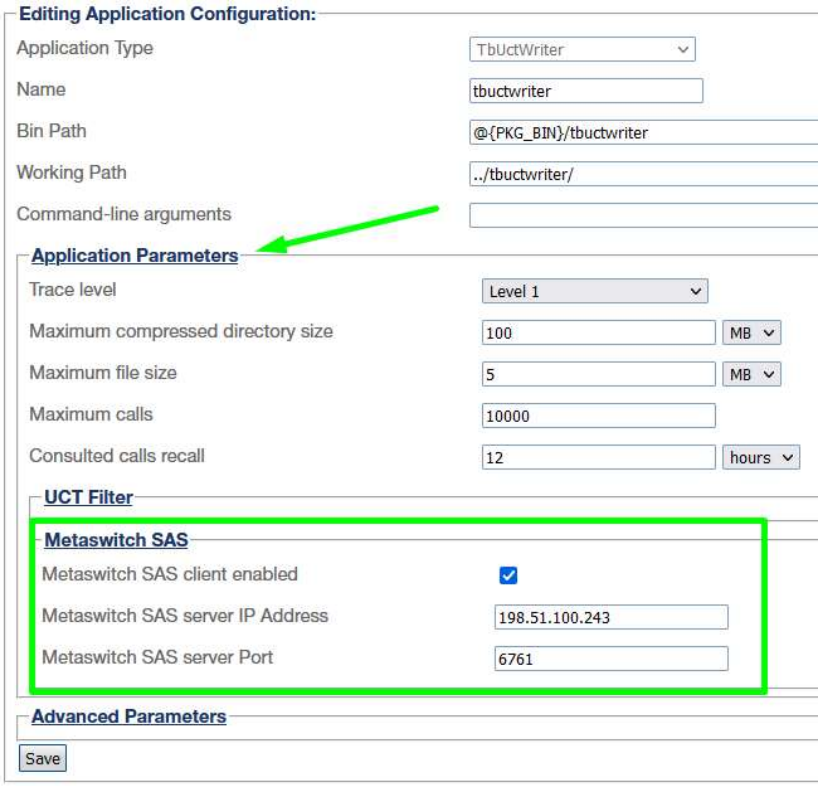


Figure 6-28 SAS Configuration

Once the correct values are filled in click '**Save**' and the configuration is complete navigate to '**System**' in the top of the Navigation Pane, select the configuration that has just been made under '**Activate configuration**' and click '**Activate**'

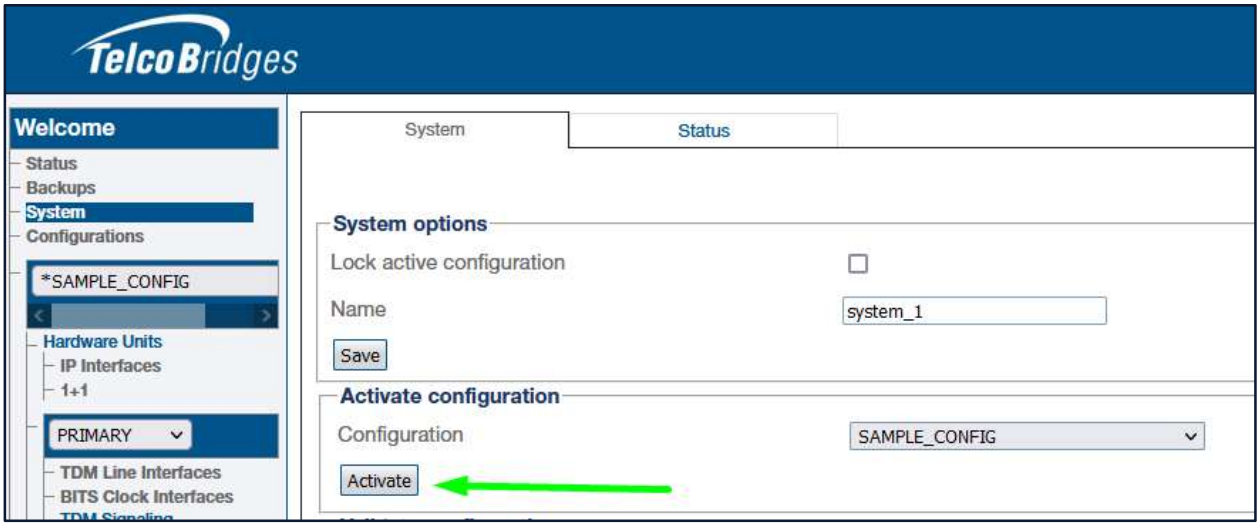


Figure 6-29 Activate Configuration

Appendix A – Glossary

Appendix B – Site Survey

It is very important to gather all information about the site, environment, and equipment before beginning installation. These tables below will help ensure all information is on hand during installation. Also you can download the spreadsheet here:

http://docs.telcobridges.com/placeholder

Gateway Info	
Serial Number if Available	
CLLI	
MTP2 Licenses Needed	
Physical Management Port	mgmt0
Use HTTPS	No
WMI Port	12358
DNS Server	
NTP Server	
MVS Trap Destination	
MVS Trap Port	
Secondary SNMP Trap Destination	
Secondary SNMP Trap Port	
SNMP Community	

Table A - 1 Gateway Info

MG IP Info	
RTP IP	
RTP VLAN	
RTP Phys Port	voip0, voip1
MG Sigtran IP	
Sigtran VLAN	
Sigtran Phys Port	voip0, voip1
H.248 MG IP	
H.248 MGC IP	
H.248 VLAN	
H.248 Phys Port	voip0, voip1
Ephemeral Termination Name	RTP/

Table A - 2 MediaGateway IP Info

TDM Info	
Primary Clock	
Backup Clock	
Number of T1s	

Physical Terminations	
APS Protection (OC3/STM-1 Only)	
Payload Type	
Signalling Technology 1-28	
Signalling Technology 29-56	
Signalling Technology 57-84	

Table A - 3 TDM Info

M2UA/MTP2 Info	
SIGTRAN Destination	
SIGTRAN Destination Port	2904
SIGTRAN Source Port	2904
MTP2 DS1:TimeSlot:Interface ID	
Timeslot Rate	64kbps

Table A - 4 M2UA and MTP2 Info

IUA Information	
MG Port	9900
MGC Port	40000
MGC IP	
IUA Link IDs	

Table A - 5 IUA Info

Appendix C – MetaView Explorer

These screenshots can serve as an example of how and where to add different aspects in the Metaswitch, please note that your tree may not be identical as nested options can change in each setup and configuration. The naming of the final resources should, however, always be the same. Such as "Signalling "Signalling Gateways", "Trunk/Access Gateways"

i. Adding the H.248 Gateway to Trunk/Access Gateways

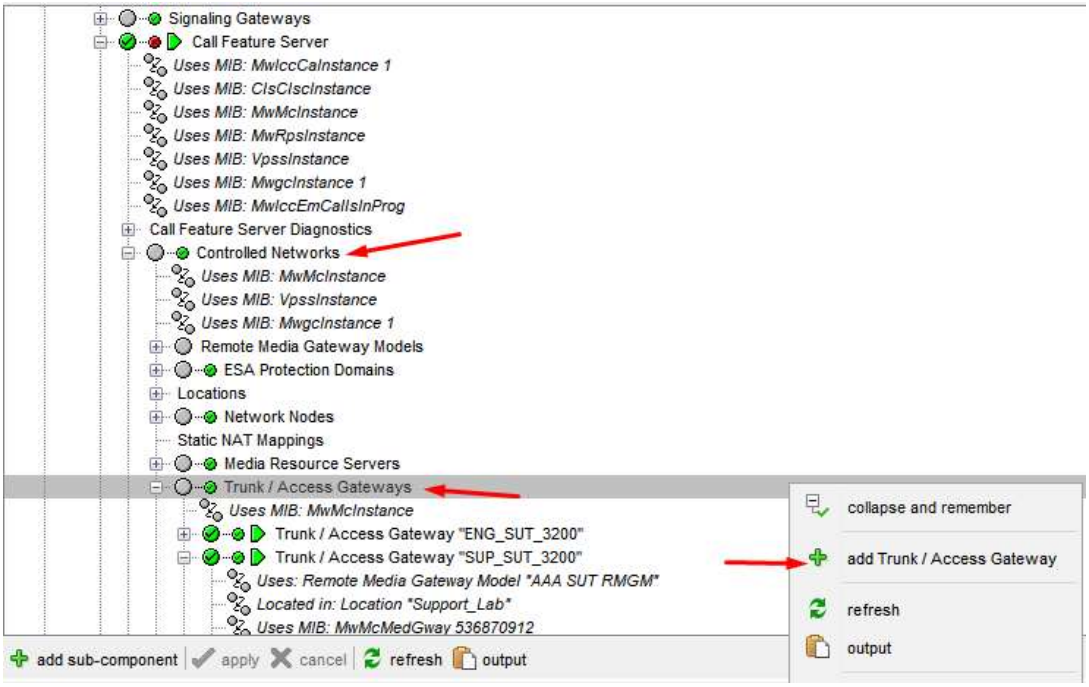


Figure C - 1 Add the TMG as a Trunk Access Gateway

Network Element "tblab-cfs" - new Trunk / Access Gateway

Name	Value	
Description		
Integrated softswitch		False
IP address (Format: IPv4)		
Domain name		
Resolved IP address		<No value>
Supported/preferred media address families	☐ Override	IPv4 [Default]
Connection security type		Insecure
Media Gateway model		TMG Remote Media Gateway Model

Figure C - 2 Required fields for a new gateway

IMPORTANT!: Metaswitch recommends to always use the 'IP Address (Format: IPv4)' field to specify the H.248 signalling address of the Tmedia Gateway. Do not use the 'Domain name' field.

ii. Ephemeral Termination Naming

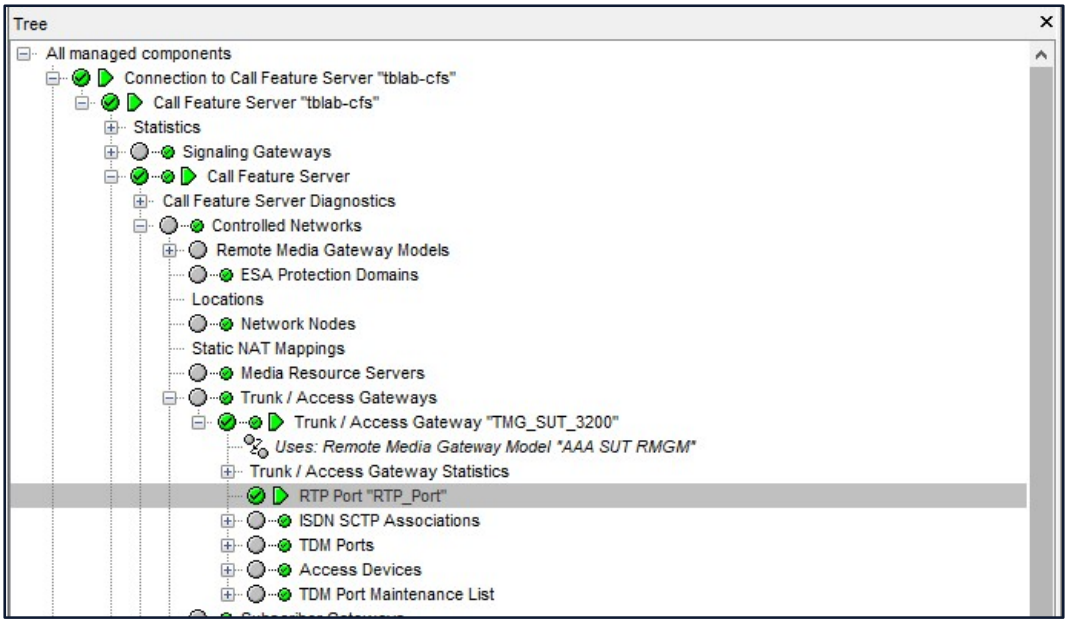


Figure C - 3 Object Tree Trunk Access Gateway - RTP Port Name

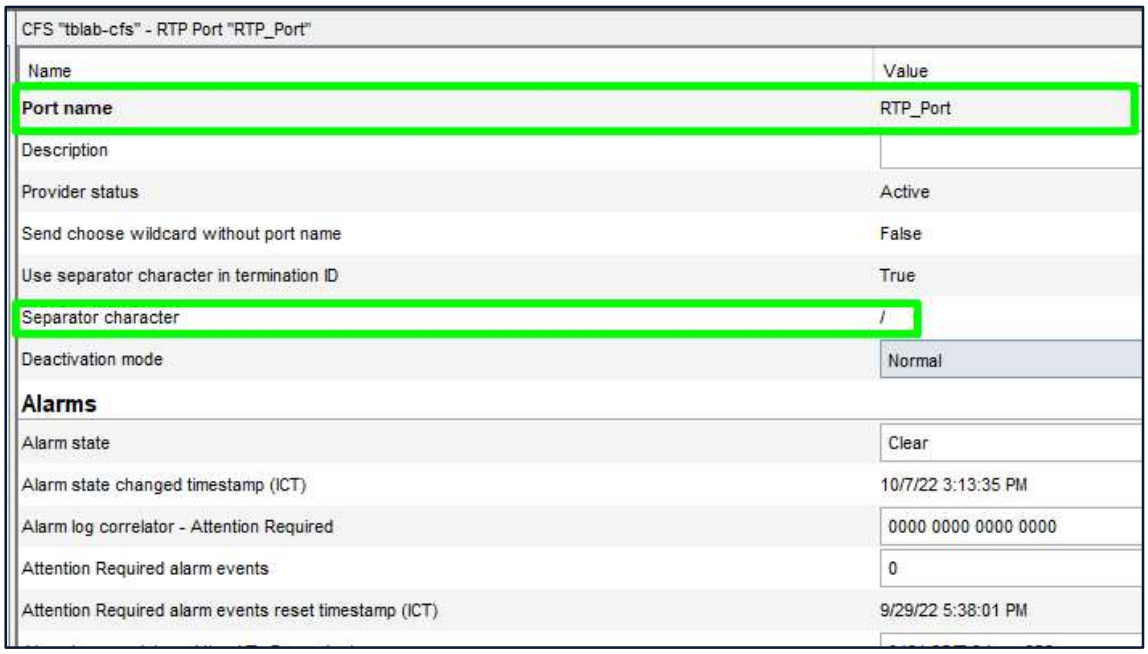


Figure C - 4 RTP Port Name

i. Fixed Termination Naming

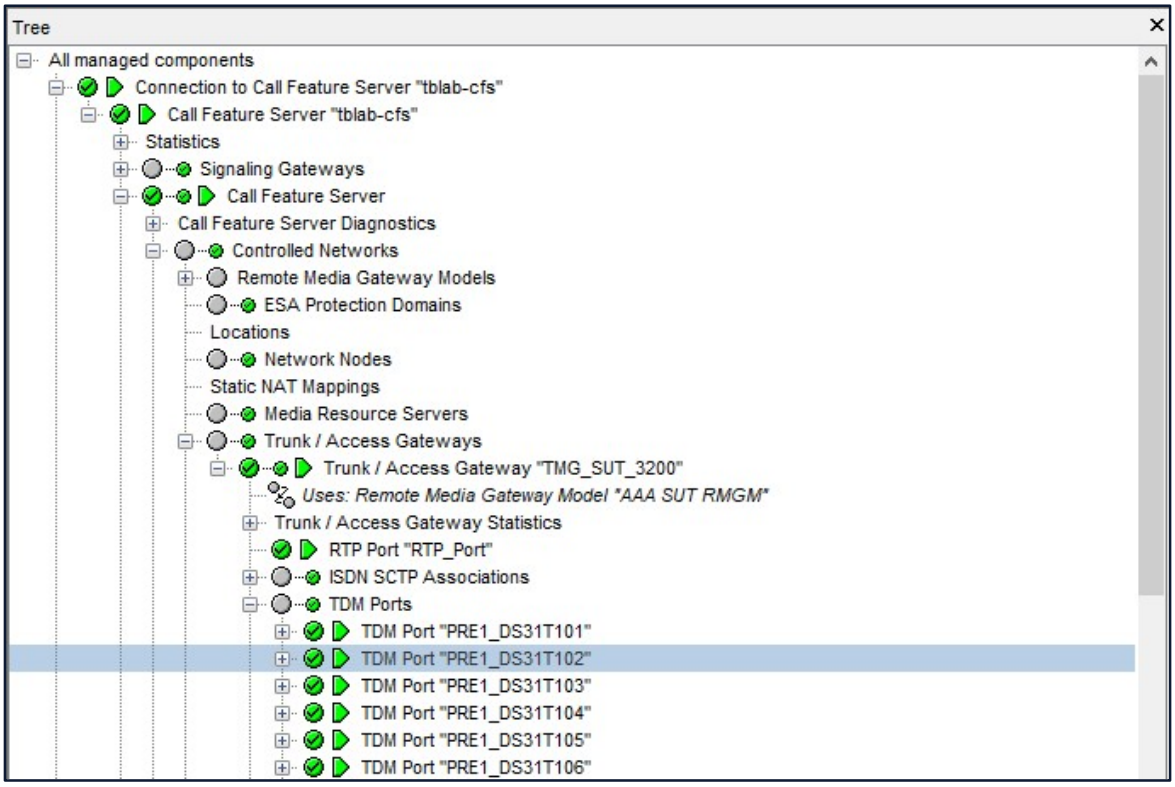


Figure C - 5 Object Tree Trunk / Access Gateway - TDM Ports Port Name

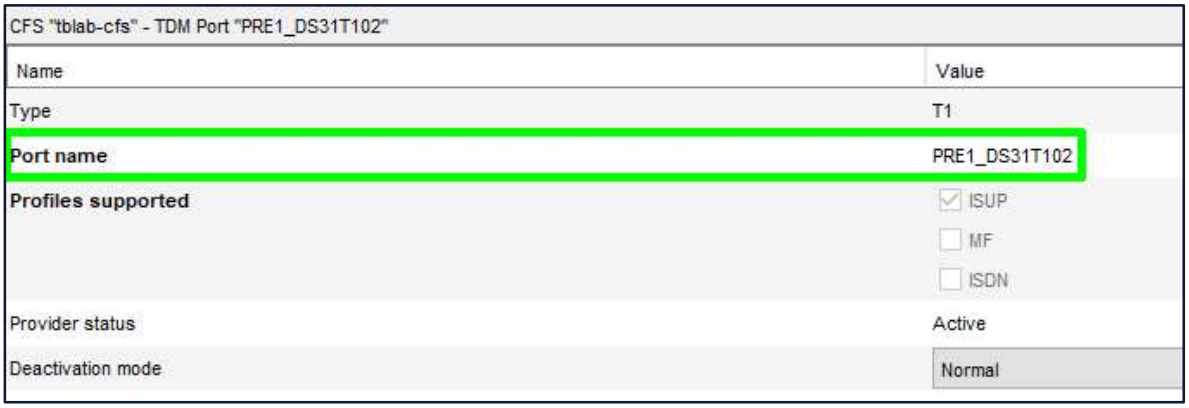


Figure C - 6 TDM Port - Port Name

ii. M2UA

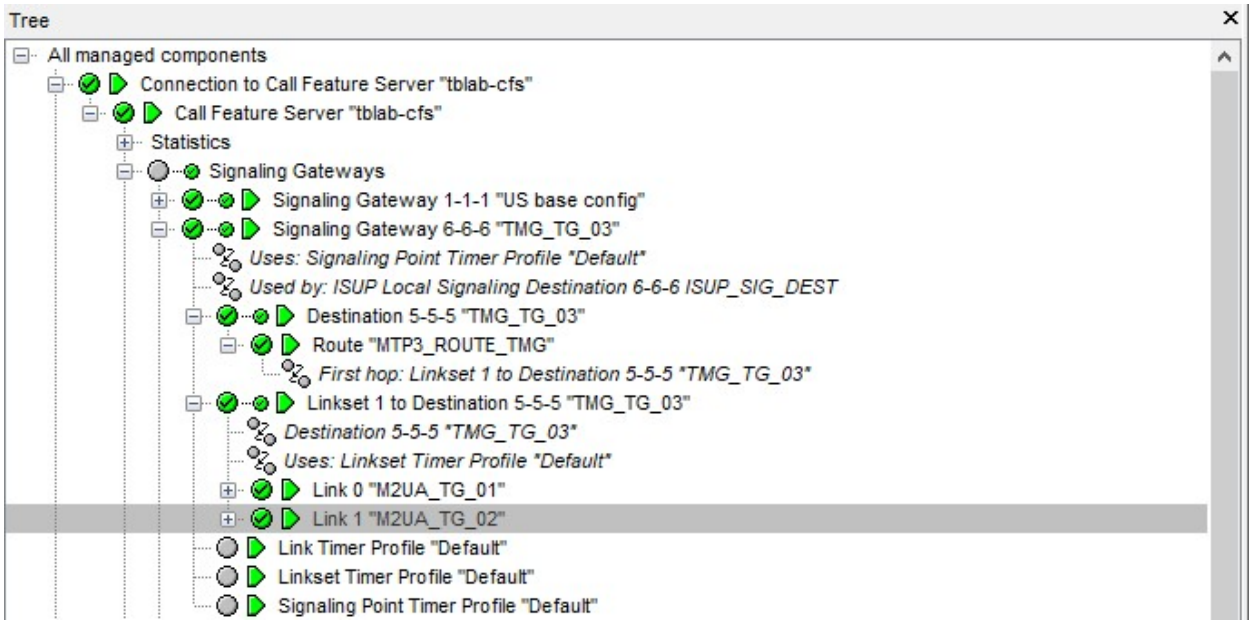


Figure C - 7 MetaView Explorer Object Tree M2UA Links

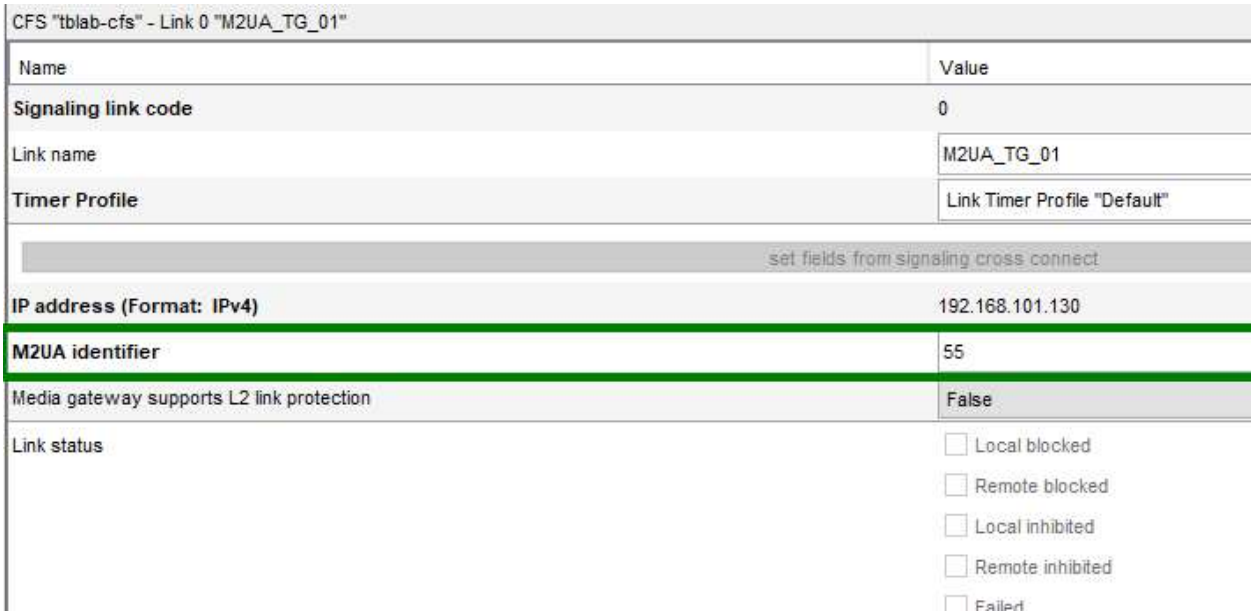


Figure C - 8 MVE M2UA Link Identifier

iii. IUA

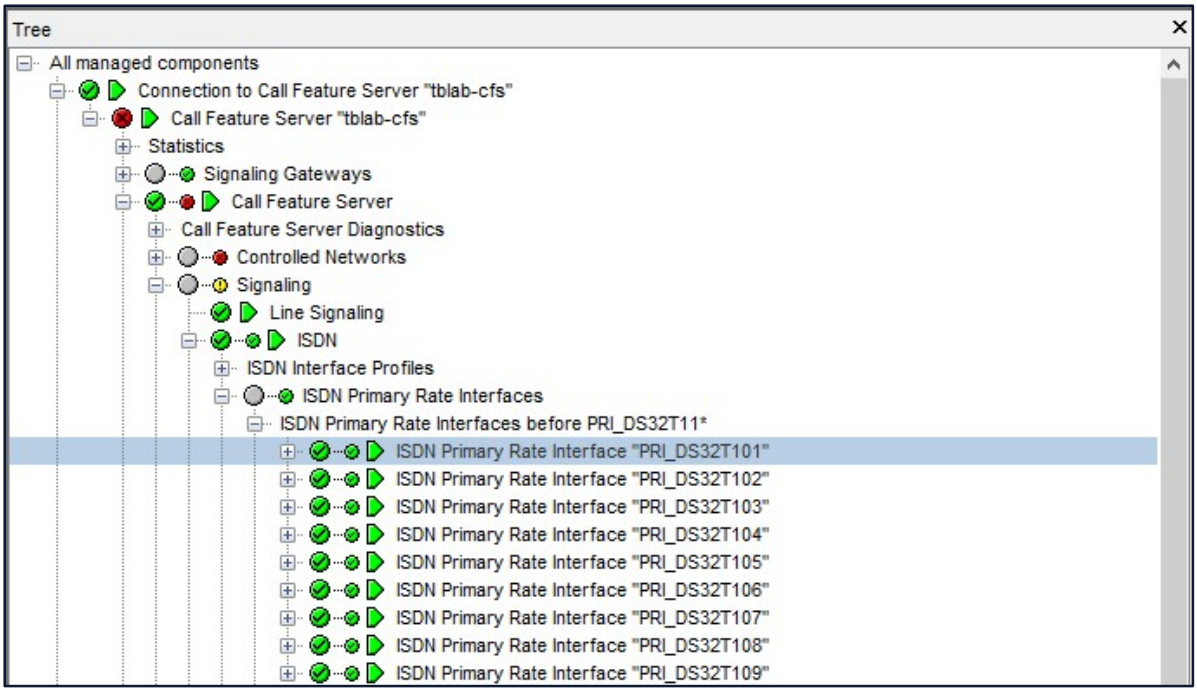


Figure C - 9 MVE Object Tree ISDN PRIs

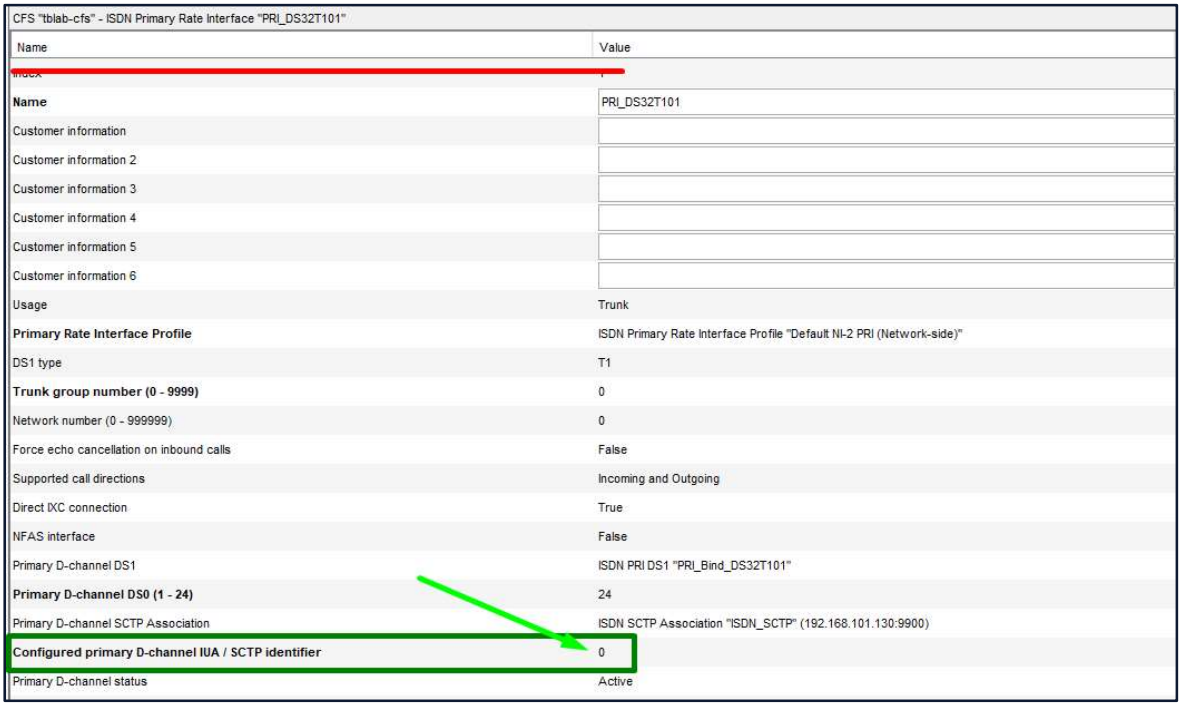


Figure C - 10 Configured primary D-channel IUA / SCTP identifier

iv. SS7 CIC/Circuit Group Configuration

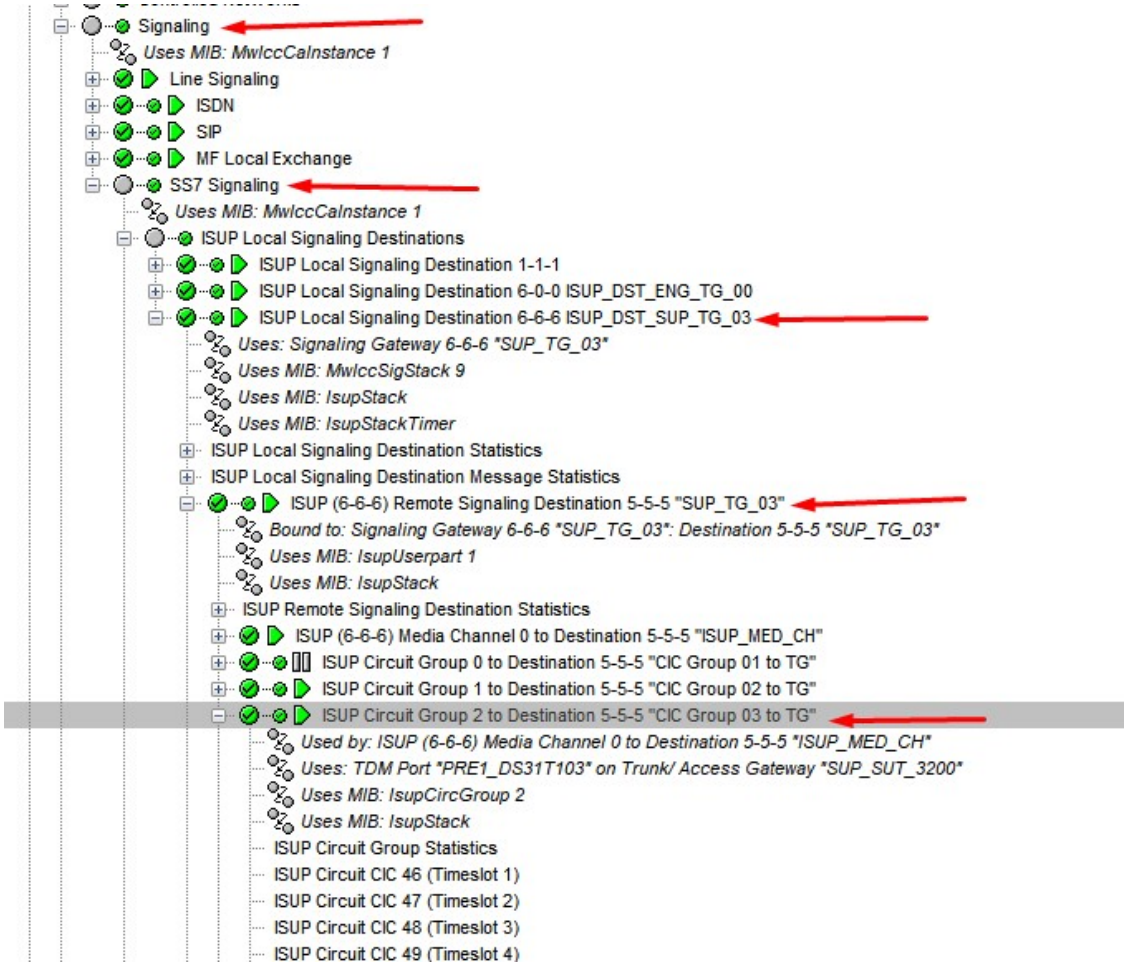


Figure C - 11 Add CICs and Circuit Groups under a Remote Destination

Appendix D – Fixed Termination Naming

i. Suggested Naming Scheme

The Metaswitch can take a maximum of 16 characters when defining a fixed termination name, this can make it difficult at times to correctly identify the proper line in large installations. Here is an example naming scheme that can be used in the larger scenarios.

```
PRE1/W/X/Y/Z/01

PRE1 = Location and Number
X = STS-3 (4 groups)
Y = STS-1 (3 groups)
Z = DS3 group
01 = DS1 number in the group.
```

```
PRE1/V/W/X/Z/01

PRE1 = Location and Number
V = STS-12
W = STS-3
X = STS-1
Z = VT 1.5 Group
01 = DS1 number in the group.
```

This recommendation is purely cosmetic and they can be named in anyway a user wants **as long as the naming is consistent between Metaswitch and TMG.**

Appendix E – Metaswann Announcement Files

By default the TMG should come with four Locales for Metaswitch Announcements.

1. en_US: English, United States
2. en_UK: English, United Kingdom
3. fr_CA: French, Canada
4. sp_LA: Spanish, Latin America.

These locals and file structures are managed by a .json file in the ‘gateway’ directory of the TMG, while the files themselves are stored directly in the toolpack package directory. Below you will see the default values of these locations but please be aware that the locations can be Version/Environment dependent and may not always be the same.

```
Configuration File:
/lib/tb/toolpack/setup/12358/3.2/apps/gateway/metaswann_config.json
```

```
Toolpack Package Folder:
/lib/tb/toolpack/pkg
```

The command ‘tbsetup’ can be used from the SSH to move directly to the current toolpack apps folder, use this command to ensure the proper locations.

ii. Default Configuration File

```
1           {
2           "metaswann_enable" : "true",
3           "metaswann_path" : "prompts/metaswitch_announcements",
4           "default_extension" : "G711A.wav",
5           "announce_source" : [
6           {
7           "locale" : "en_US",
8           "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
9           },
10          {
11          "locale" : "en_UK",
12          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
13          },
14          {
15          "locale" : "fr_CA",
16          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
17          },
18          {
19          "locale" : "sp_LA",
20          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
21          }
22          ],
23          "source_filename" : "announce_config.src",}
```

The first three lines should be checked thoroughly, making sure ‘metaswann_enable’ is set to ‘true’, the relative path to find each locale*, and the naming/encoding of the announcements files to use by default.

**This path is relative to the Toolpack Package path mentioned above, so this file will look in: /lib/tb/toolpack/pkg/prompts/metaswitch_announcements/en_US*
For United States English Announcements by default.

iii. Adding a New Locale

Adding a new locale to the TMG is as simple as adding the files to the ‘metaswann_path’ directory mentioned in the configuration file and then including that directory tree into configuration file.

This file is a .json file with standard formatting, and it reads like a dictionary in a `{“key”:“value”}` format. Keys and Values are always pairs separated by a colon. Multiple key and value pairs exist, separated by a comma. All of these keys are strings, as denoted by being enclosed in single or double quotation marks. The value “true” of the key “metaswann_enable” is also a string, as it is also enclosed by quotation marks.

It is important to note that values are not always strings. In the case of the key “announce_source” the value is a list of objects separated by commas. This is denoted by the value being enclosed in square brackets.

It is also important to note that the values in the list are also not always strings, the list in the value of “announce_source” is populated with more dictionaries, we can tell these are dictinoaries because they are enclosed in curly braces. Each locale is it’s own dictionary with two static Keys and two dynamic Values.

The value of the “locale” key should be a string of the name of your locale folder on the TMG enclosed in quotation marks.

The value of the “source_directory” key should be a list of strings of each subfolder within that local.

As an example below see a modified configuration file adding an Canadian English Option:

```
1           {
2           "metaswann_enable" : "true",
3           "metaswann_path" : "prompts/metaswitch_announcements",
4           "default_extension" : "G711A.wav",
5           "announce_source" : [
6           {
7           "locale" : "en_US",
8           "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
9           },
10          {
11          "locale" : "en_UK",
12          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
13          },
14          {
15          "locale" : "fr_CA",
16          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
17          },
18          {
19          "locale" : "sp_LA",
20          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
21          },
22          {
23          "locale" : "en_CA",
24          "source_directory" :
    "ar_announce,bg_announce,cfw_announce,cnd_announce,cot_announce,generic_announce,inc_anno
    unce,msg_announce,out_announce,sle_announce,spd_announce,trn_announce",
25          },
26          ],
27          "source_filename" : "announce_config.src",}
```

Once changes are made you should restart the gateway and tbstreamserver applications on your TMG for them to take effect.

Appendix F – CASR1 and MF Variants

i. Supported Variants

Different Variants of CASR1 and Multi-Frequency trunks need to be setup independently on the Metaswitch and the TMG. Below you will find the Supported Variants along with the proper .lua script to choose in the CAS Stack Creation mentioned in *Section 6.2.1*

- Ground-Start CASR1 – gsn_ms.lua
- Loop-Start CASR1 – lsn_ms.lua
- E&M Subscriber Lines e_m_inband.lua
- E&M Multi-Frequency Trunks e_m_mf.lua

E&M Variants include Wink Start and Wink Start Ack using the scripts ending in ws.lua and wsack.lua.

End Users may also view and modify the scripts to fit their needs in the 'Scripts' tab at the top of the screen:

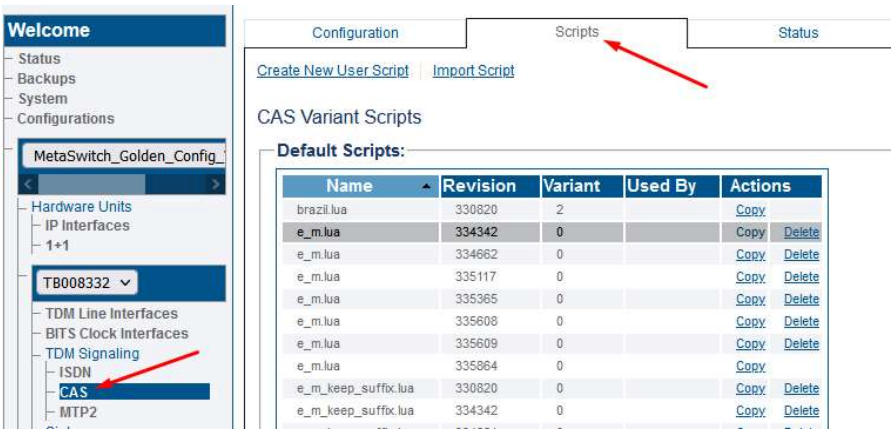


Figure F - 1 Scripts Tab in the CAS Stacks Page

You can duplicate one of the scripts by clicking copy in the Actions column on the right. After copying of the of existing scripts it will appear in the table below labelled "User Scripts"

Once the script appears in the "User Scripts" you can click its name where you will be linked to an internal script editor.

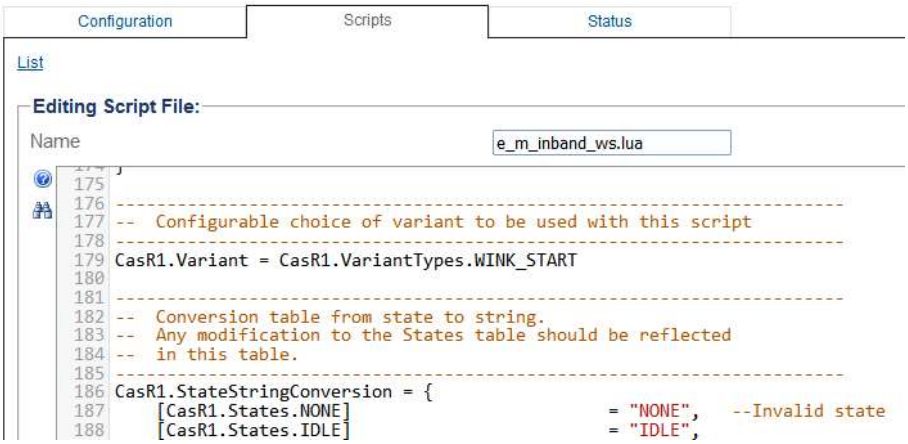


Figure F - 2 TMG WebGUI's Built in Script Editor

ii. Remote Configuration

On an incoming call in Wink Start mode, TMG devices will send a wink to acknowledge the start of the call. The TMG then requires to have a minimum delay of 250ms before the digits are played from the remote device. Please make sure the “Outpulse delay” or the equivalent parameter is set to 250ms or greater on the remote device.

Name	Value
CAS bits for Idle detection	0,0
CAS bits for Seized detection	1,1
CAS bits for Idle transmission	0,0
CAS bits for Seized transmission	1,1
Wink generation duration (1 - 65535 milliseconds)	200
Min wink detection duration (1 - 65535 milliseconds)	100
Max wink detection duration (1 - 65535 milliseconds)	350
Seize debounce time (1 - 65535 milliseconds)	150
Min seize duration (1 - 65535 milliseconds)	350
Flash generation duration (1 - 65535 milliseconds)	450
Min flash detection duration (1 - 65535 milliseconds)	200
Max flash detection duration (1 - 65535 milliseconds)	1550
Idle debounce time (1 - 65535 milliseconds)	400
Min idle duration (1 - 65535 milliseconds)	1550
KP digit duration (1 - 65535 milliseconds)	70
MF or ST digit duration (1 - 65535 milliseconds)	70
Amplitude of 1st component of tone (-32767 - 32767 dBm)	-7
Amplitude of 2nd component of tone (-32767 - 32767 dBm)	-7
Interdigit spacing (1 - 65535 milliseconds)	60
Frequency set	US
Wink delay (1 - 65535 milliseconds)	100
Outpulse delay (1 - 65535 milliseconds)	250

Figure F - 3 Example Third Party MF profile setting set to 250ms

iii. Additional Notes

When configuring a CAS line on the Metaswitch as an Access Device, always ensure that “Line side answer supervision supported” is set True.

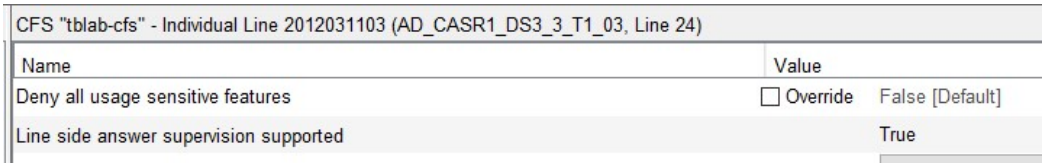


Figure F - 4 Line side answer supervision supported