

Codec Configuration

All units

DGW 49.2.2941

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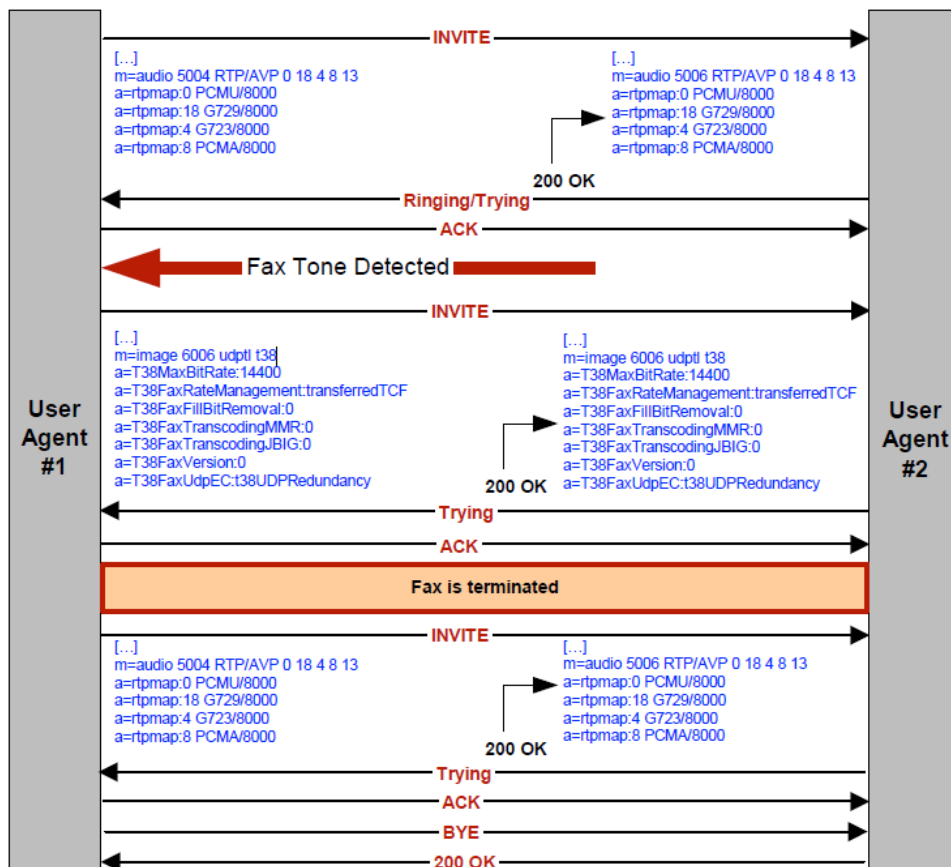
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Basic Fax Concepts

T.38 Fax

The Mediatrix unit can send faxes in T.38 mode over UDP. T.38 is used for fax if both units are T.38 capable; otherwise, transmission in clear channel over G.711 as defined is used (if G.711 μ -law and/or G.711 A-law are enabled). If no clear channel codecs are enabled and the other endpoint is not T.38 capable, the fax transmission fails.



Note: The Mediatrix unit opens the T.38 channel only after receiving the “200 OK” message from the peer.

Note: Media5 recommends not to use a fax that does not send a CNG tone. If using such a fax to send a fax communication to the public network, this might result in a communication failure.

Fax Parameters

The Mediatrix unit handles G3 fax transmissions at speeds up to 14.4 kbps. Automatic fax mode detection is standard on all endpoints. Real-Time Fax Over UDP with the T.38 protocol stack is also available.

A fax call works much like a regular voice call, with the following differences:

- The fax codec may be re-negotiated by using a reINVITE.
- The goal of the reINVITE is to allow both user agents to agree on a fax codec, which is either:
 - Clear channel (G.711 or G.726) without Echo Cancellation nor Silence Suppression (automatically disabled).
 - T.38.
- Upon fax termination, if the call is not BYE, the previous voice codec is recovered with another reINVITE.
- For fax speeds higher than 14.4 kbps, the Clear channel codec is recommended.

Fax Information Required for Troubleshooting

Information	Type	
Fax Transmission Protocol	Clear Mode	T.38
Fax Transmission Speed	High speed	Low speed
Fax mode	Automatic	Manual
Receiving fax	Model	Make
Sending fax	Model	Make
Fax mode	ECM	non- ECM
Firewall	Yes	No

T.38 Fax Transmission

T.38 is an ITU recommendation for allowing transmission of fax over IP networks in real time.

PROs

- Allows for redundancy, therefore increases the reliability of the transmissions.
- Faxes in T.38 are not as sensitive to network imperfection like packet loss or jitter as faxes in Clear Channel.

CONs

- The number of redundancy packets will increase the bandwidth used
- The higher the speed, the more bandwidth is used.
- May take more bandwidth than a fax in Clear channel.

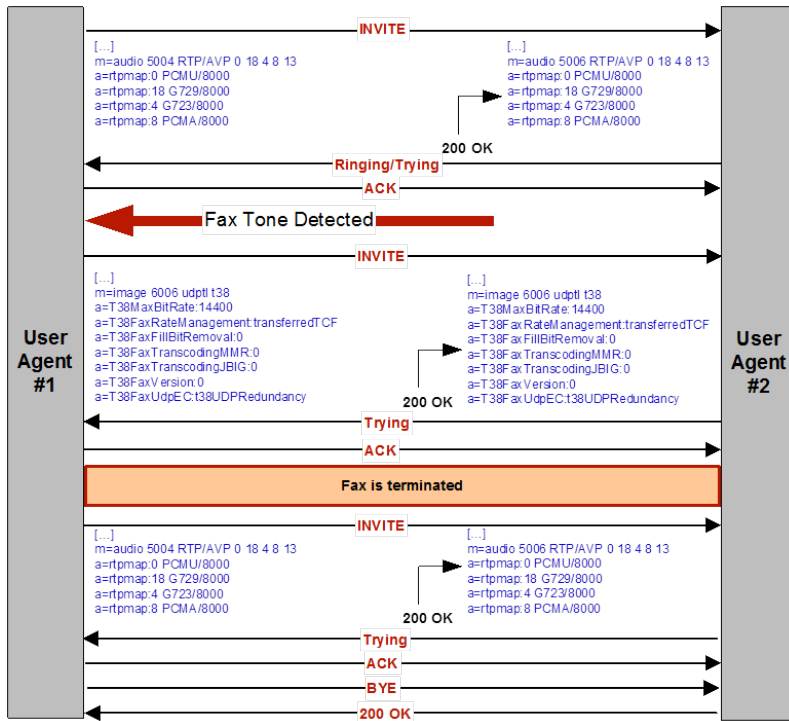
Requirements

- The Mediatrix must be able to detect a CNG , v21 preamble or T.38 packet to switch to T.38
- Reasonable delay, 1 second round trip is acceptable however 2 seconds could cause timeout or collision

Configuration

- [Enabling T.38 Fax Transmission](#) (p.13)
- [Setting the Redundancy Level](#) (p.13)
- [Allowing Unsecure T.38 with Secure RTP](#) (p.11)
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Call Flow



Fax Transmission through a Firewall

Using T.38 with a Firewall

Requirements

- The communication channel must remain open for a fax to go through a firewall i.e. the unit sends "no signal" packets to fill the dead air intervals that could occur during a fax transmission and cause the closure of the firewall.

Configuration

- [Configuring the T.38 No Signal](#) (p.14)

Clear Channel Fax Transmission

Modulated Fax information from the PSTN is passed in-band end-to-end over a voice speech path in a IP network.

There are 2 pass-through techniques.

- The configured voice codec is used for fax transmission. This technique works only when the configured codec is G711 with no VAD and no echo cancellation (EC) or when the configured

codec is a clear channel codec or G.726/32. Low bit-rate codecs cannot be used for fax transmission.

- Gateway dynamically changes the codec from the codec configured for voice to G.711 with no VAD and no EC for the duration of the fax session. This method is referred to as "codec up speed" or "fax pass-through with up speed".

PROs

- Less intrusive, does not modify the packets
- Does not allow for redundancy
- Takes less bandwidth than a T.38 fax transmission
- The bandwidth usage is practically constant.
- Bandwidth only affected by the P-Time.

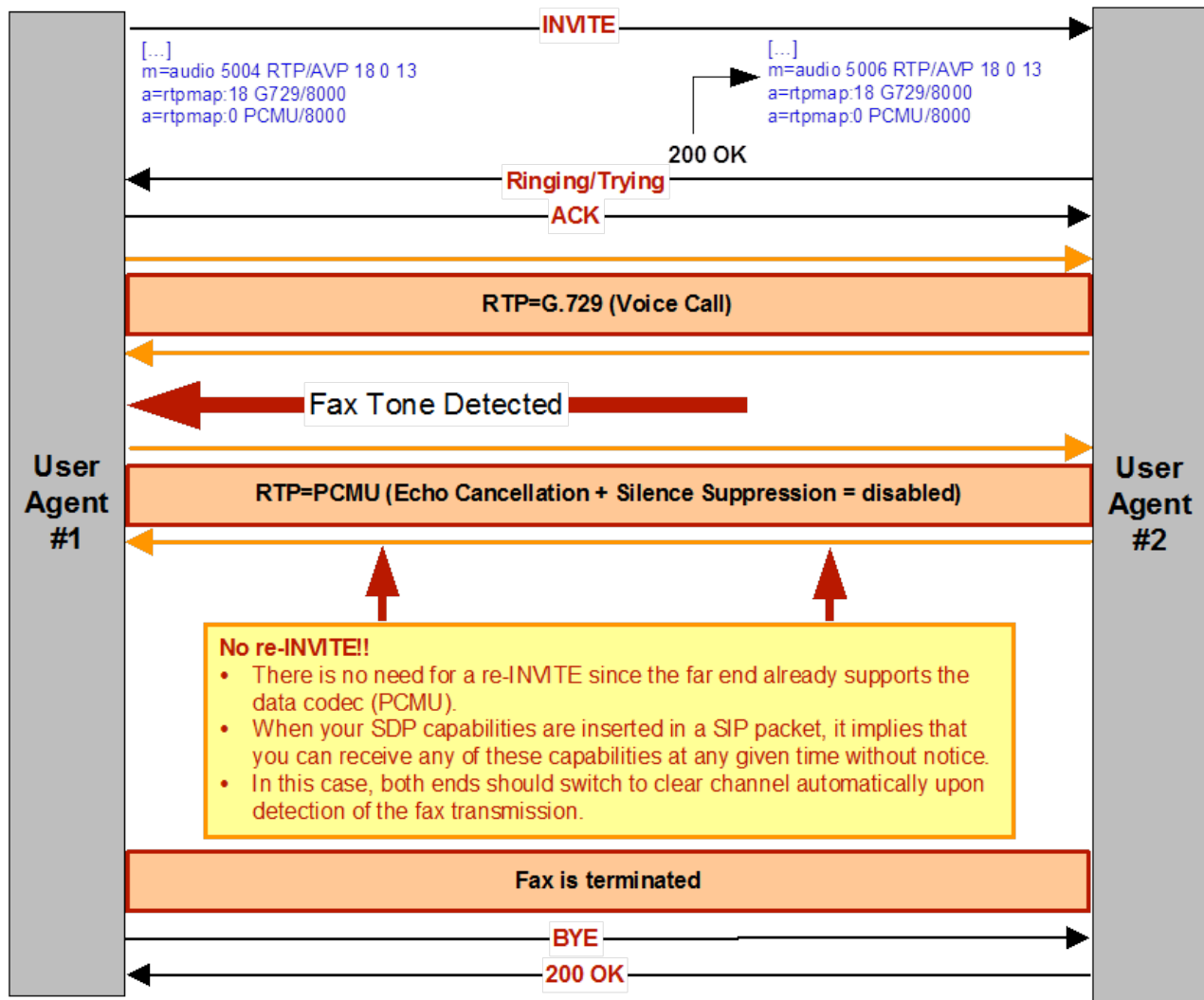
CONs

- Sensitive to network imperfection like packet loss or jitter

Configuration

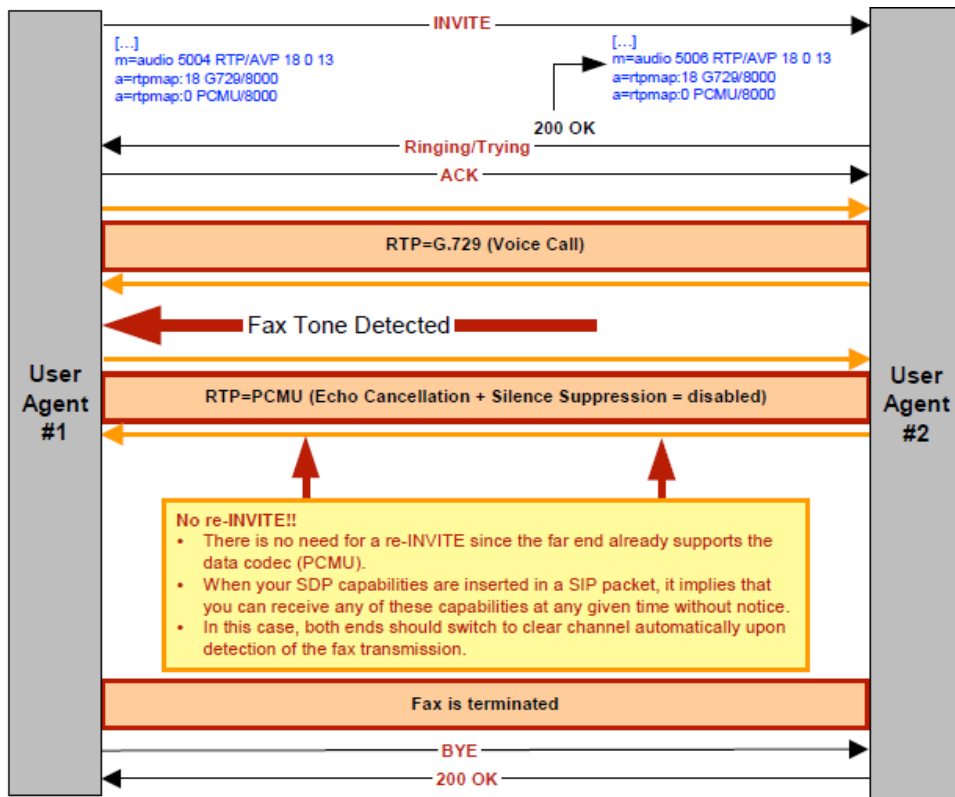
[Configuring the Clear Channel Fax Transmission](#) (p.16)

Call Flow



Clear Channel Fax Flow

For more details on Clear Channel Fax limitations, please refer to the [DGW Configuration Guide - Limitations of DGW Platforms](#) published on the [Media5 Documentation Portal](#).



FAX Detection Flow

IF	AND	THEN
If T.38 is enabled	- A CNG tone is detected, or - A V.21 preamble is detected, or - T.38 packets are received on the IP side	Then the Mediatix switches to T.38
- If a CED tone is detected (Answer Tone or ANS) and no other conditions indicates that a fax is present, or - If a fax is detected but T.38 is deactivated		Then the Mediatix unit switches to Clear mode.

IF	AND	THEN
If a CED Note: Note that the CED tone can be detected on both the IP side (egress side) or on the analog side (ingress side). is detected before a CNG		The Mediatrix unit will first switch to Clear Channel and if T.38 is enabled, it will then switch to T.38.

Configuring the Behavior of the T.38 INVITE Not Accepted

This task allows you to set the unit's behaviour after receiving an error to a SIP INVITE for T.38 fax.

Steps

- 1) Go to **SIP/Interop**.
- 2) In the **Behavior on T.38 INVITE Not Accepted** table, from the **Behavior** selection list, set the required behavior for each **SIP Error Code**.
- 3) Click **Apply**.

Result

Behavior on T.38 INVITE Not Accepted		
SIP Error Code	Behavior	
406	Re-INVITE For Clear Channel Only	
415	Drop Call	
488	Re-INVITE For Clear Channel Only	
	Re-Establish Audio	
	Use Previous Media Negotiation	
606	Re-INVITE For Clear Channel Only	

Allowing Unsecure T.38 with Secure RTP

Information

The T.38 protocol must be enabled under **Media/Codec**.

This procedure is required only if SRTP is used and is available provided the **Select Endpoint** selection list is set to **Default**.

Steps

- 1) Go to **Media/Security**.
- 2) In the **Security** table, under the **RTP** section, set the **Mode** selection list to **Secure with fallback**.
- 3) Under the **T.38** section, set the **Allow Unsecure T.38 with Secure RTP** selection list to **Yes**.

4) Click **Apply**.

Result

Select Endpoint: Default ▾

Security	
RTP	
Mode:	Secure with fallback ▾
Key Management Protocol:	Key Management Protocol for SRTP ▾
Encryption:	AES_CM_128 ▾
T.38	
Allow unsecure T.38 with secure RTP:	Yes ▾

Basic Fax Tasks

Enabling T.38 Fax Transmission

Steps

- 1) Go to **Media/Codecs**.
- 2) In the **Codec** section, click  located on the same line as **T.38**.
- 3) Set the **Enable** field to **Enable**.
- 4) Click **Apply**.

Result

T.38	
Enable:	Enable
Priority:	10
Redundancy Level:	3
Detection Threshold:	Default
Frame Redundancy Level:	0
No Signal:	Disable
No Signal Timeout:	1

Setting the Redundancy Level

Steps

- 1) Go to **Media/Codecs**.
- 2) In the **Codec** section, click  located on the same line as **T.38**.
- 3) In the **T.38** table, set the **Redundancy Level**.

Note: Using redundancy increases transmission reliability, however the number of redundancy packets will also increase the bandwidth being used.

4) Set the **Frame Redundancy Level**.

Note: The repetition of the final frame will help prevent losing the end of a message, v.21 or end of page message. Losing the end of packet message can create a major problem in the transmission since the Redundancy is not use in this situation.

5) Click **Apply**.

Result

T.38	
Enable:	Enable ▼
Priority:	10
Redundancy Level:	3
Detection Threshold:	Default ▼
Frame Redundancy Level:	0
No Signal:	Disable ▼
No Signal Timeout:	1

Configuring the T.38 No Signal

Steps

- 1) Go to **Media/Codecs**.
- 2) Click  located on the same row as **T.38**.
- 3) Set the **No Signal** selection list to **Enable**.
- 4) Set the **No Signal Timeout** selection list to **Enable**.

Note: In order to keep RTP ports opened for T.38 packets, the unit will send 'no signal' packets to fill the dead air intervals that could occur during a fax transmission and cause the closure of the firewall.

5) Click **Apply**.

Result

T.38	
Enable:	Enable ▼
Priority:	10
Redundancy Level:	3
Detection Threshold:	Default ▼
Frame Redundancy Level:	0
No Signal:	Disable ▼
No Signal Timeout:	1

Configuring the T.38 No Signal Timeout

Steps

- 1) Go to **Media/Codecs**.
- 2) Click  located on the same row as **T.38**.
- 3) Set the **No Signal Timeout** selection list to **Enable**.

Note: In order to keep RTP ports opened for T.38 packets, the unit will send 'no signal' packets to fill the dead air intervals that could occur during a fax transmission and cause the closure of the firewall.

- 4) Click **Apply**.

Result

T.38	
Enable:	Enable ▼
Priority:	10
Redundancy Level:	3
Detection Threshold:	Default ▼
Frame Redundancy Level:	0
No Signal:	Disable ▼
No Signal Timeout:	1

Configuring the Clear Channel Fax Transmission

Steps

- 1) Go to **Media/Codecs**.
- 2) In the **Codec** section, click  located on the same line as the Codec you wish to use for Fax Transmission.
- 3) In the selected Codec table, set the fields as required.
- 4) Make sure to enable the **Data Transmission**.
- 5) Click **Apply**.

Result

For example:

Clear Mode	
Voice Transmission:	Disable ▾
Voice Priority:	0
Data Transmission:	Enable ▾
Data Priority:	10
Payload Type:	124
Minimum Packetization Time:	10 ms ▾
Maximum Packetization Time:	30 ms ▾

Selecting the Base Port for T.38 Fax Calls

Steps

- 1) Go to **Media/Misc.**
- 2) In the **Base Port** table, enter the first port to be used for T.38 Fax calls in the **T.38** field.

Note: If you do not know which port to use, refer to the [Technical Bulletin - Ports and Protocol Settings](#) published on the [Media5 Documentation Portal](#).

- 3) Click **Apply**.

Result

Base Ports	
RTP:	5004
SRTP:	5004
T.38:	First port number to use

Basic Codec Concepts

Default vs Specific Endpoint Configuration

It is possible to configure all endpoints to the default value, or an endpoint to a specific value, or a mix of both.

When you do not change your configuration, the values keep the default configuration. In order to modify the codec settings for a specific endpoint, the endpoint must first be selected from the drop-down list. It is also possible to have a default configuration followed by one or more specific endpoint configurations.

- Default configuration
- Mix of default and specific endpoint configurations
- All endpoints enabled with specific configurations

Codec Configuration

This document describes the steps required to enable or disable the codecs of the Mediatix unit, as well as access the codec-specific parameters.

The Codec section allows setting two types of configurations:

- Default configurations that apply to all endpoints of the Mediatix unit.
- Specific configurations that override the default configurations. Specific configurations can be set for each endpoint in the Mediatix unit.

Codec Vs Bearer Capabilities

The Codec Vs. Bearer Capabilities Mapping section allows you to select the codec to prioritise or select in the outgoing INVITE when the incoming SETUP ITC (Information Transfer Capability) matches the configured one. It is also possible to select the ITC value to set in the outgoing SETUP bearer capabilities when the incoming INVITE codec matches the configured one.

Note: This section is only available for units with ISDN interfaces.

Generic Voice Activity Detection (VAD)

VAD defines how the Mediatrix sends information pertaining to silence. This allows the unit to detect when the user talks, thus avoiding to send silent RTP packets.

The Generic Voice Activity Detection (VAD) section allows selecting two types of configurations:

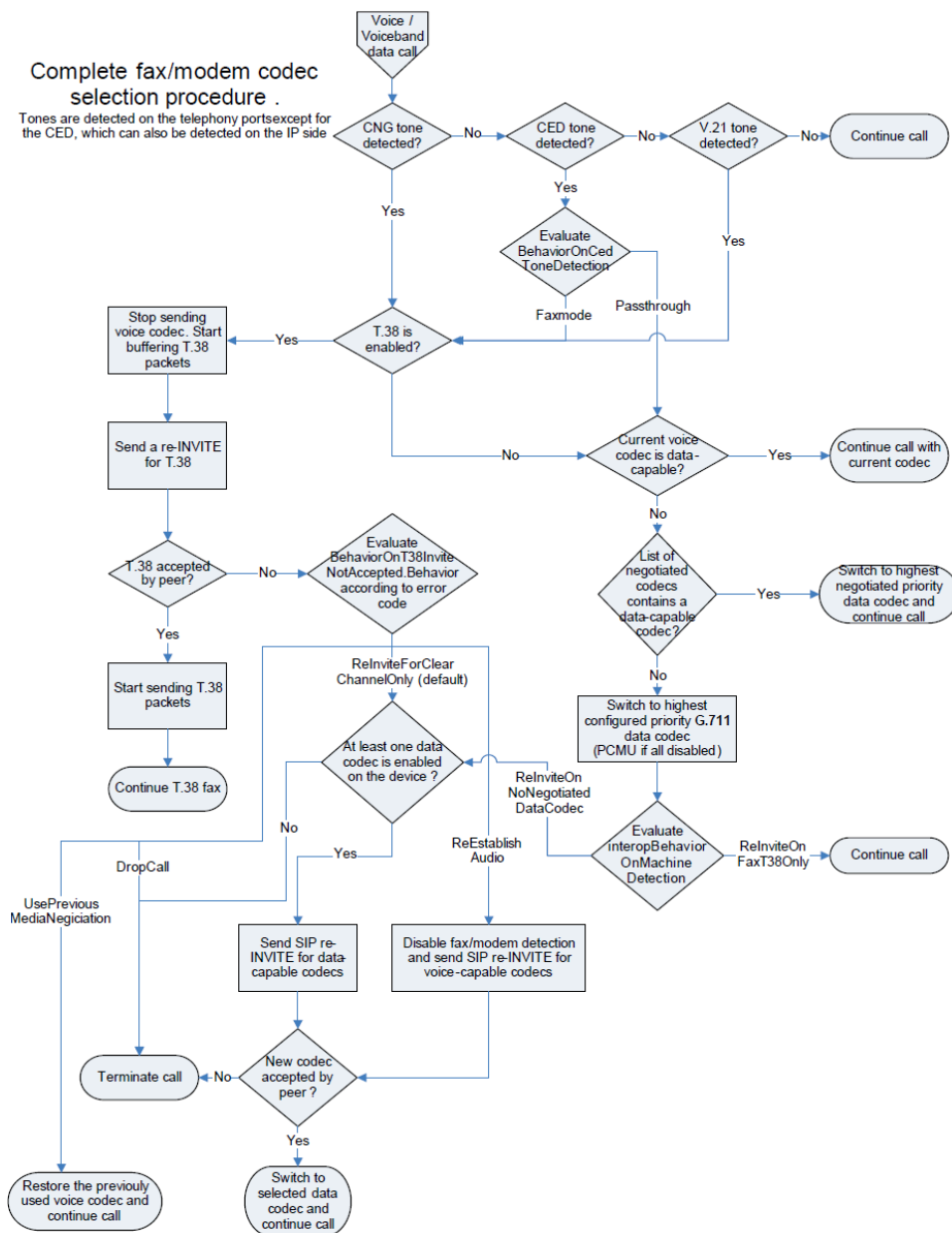
- Default configurations that apply to all endpoints of the Mediatrix unit.
- Specific configurations that override the default configurations. Specific configurations can be set for each endpoint in the Mediatrix unit.

Data Codec Selection Procedure Flow

The Mediatrix unit follows a procedure when selecting data codec. This procedure is the Mediatrix unit default behaviour. Some interop parameter may modify this procedure. Tones are detected on the analog ports only.

Complete fax/modem codec selection procedure .

Tones are detected on the telephony port except for the CED, which can also be detected on the IP side



Basic Codec Tasks

Enabling Default Codecs

Steps

- 1) Go to **Media/Codecs**.
- 2) From the **Select Codec Bank**, choose if you want the G.722 , the G.723.1, G.726 or G.729 codec.

Note: All Codec Banks include the T.38, the Clear Mode, the Clear Channel, and the X-CCD codecs.

- 3) In the **Codec** table, select the desired codecs and **Enable** / **Disable** them.

Note: Codecs that appear in Red are not part of the selected codec Bank, thus they can be disabled without a problem.

- 4) Click  for Advanced codec settings.

Note: When enabling two codecs or more, the priority order can be modified by selecting the advanced options.

- 5) Click **Apply**.

Result

Select Codec Bank: **G.723.1, G.726, and G.729** (always includes G.711, T.38, Clear Mode, Clear Channel, and X-CCD)

Select Endpoint: **Default**

Codec	Voice	Data	Advanced	
G.711 a-Law	Enable	Enable		
G.711 u-Law	Enable	Enable		
G.722	Disable			
G.723.1	Disable			
G.726 16Kbps	Disable			
G.726 24Kbps	Disable			
G.726 32Kbps	Disable	Disable		
G.726 40Kbps	Disable	Disable		
G.729	Enable			
T.38		Enable		
Clear Mode	Disable	Disable		
Clear Channel	Disable	Enable		
X-CCD	Disable	Disable		

Enabling Codecs For Specific Endpoints

Steps

- 1) Go to **Media/Codecs**.
- 2) From the **Select Codec Bank**, choose if you want the G.722 , the G.723.1, G.726 or G.729 codec.

Note: All Codec Banks include the T.38, the Clear Mode, the Clear Channel, and the X-CCD codecs.

- 3) From the **Select Endpoint** drop-down list select the port you want to configure.
- 4) In the **Codec** table, from the **Endpoint Specific** drop-down list, select **Yes** for the desired codecs and **Enable/Disable** them.

Note: When enabling two codecs or more, the priority order can be modified by selecting the advanced options.

- 5) Click for Advanced codec options.
- 6) Click **Apply**.

Result

Select Codec Bank: **G.723.1, G.726, and G.729** (always includes G.711, T.38, Clear Mode, Clear Channel, and X-CCD)

Select Endpoint: **Slot1/E1T1**

Codec	Endpoint Specific	Voice	Data	Advanced	
G.711 a-Law	Yes	Enable	Disable		
G.711 u-Law	Yes	Enable	Disable		
G.722	No	Disable			
G.723.1	No	Enable			
G.726 16Kbps	No	Disable			
G.726 24Kbps	No	Disable			
G.726 32Kbps	No	Disable	Disable		
G.726 40Kbps	No	Disable	Disable		
G.729	No	Enable			
T.38	Yes		Enable		
Clear Mode	No	Disable	Disable		
Clear Channel	No	Disable	Disable		
X-CCD	No	Disable	Disable		

Configuring Codec Vs. Bearer Capabilities Mapping

Steps

- 1) Go to **Media/Codecs**.
- 2) In the **Codecs vs. Bearer Capabilities Mapping** table, select **Enable** from the **Enable** drop-down list.
- 3) For each enabled codec, complete the fields are required.
- 4) Click **Apply**.

Result

Codec vs. Bearer Capabilities Mapping					
Index	Enable	Codec	Mapping Type	ITC	
1	Enable	Clear Mode	Prioritize	unrestricted	
2	Disable	G.729	Prioritize	speech	
3	Disable	G.729	Prioritize	speech	

Configuring Generic Voice Activity Detection (VAD)

Steps

- 1) Go to **Media/Codecs**.

- 2) From the **Select Codec Bank**, choose if you want the G.722 , the G.723.1, G.726 or G.729 codec.

Note: All Codec Banks include the T.38, the Clear Mode, the Clear Channel, and the X-CCD codecs.

- 3) In the **Generic Voice Activity Detection (VAD)** table,
- 4) set **Enable (G.711, G.722 and G.726)** to the proper setting from the drop-down list.
- 5) Click **Apply**.

Result

Generic Voice Activity Detection (VAD)	
Enable (G.711, G.722, and G.726):	Disable ▾

Configuring Generic Voice Activity Detection (VAD) For Specific Endpoint

Steps

- 1) Go to **Media/Codecs**.
- 2) From the **Select Endpoint** drop-down list select the port to configure.
- 3) In the **Generic Voice Activity Detection (VAD)** table, from the **Endpoint Specific** drop-down list, select **Yes**.
- 4) Enable the G.711 and G.726 Voice Activity Detection (VAD) by selecting the proper setting in the drop-down list.
- 5) Click **Apply**.

Result

Generic Voice Activity Detection (VAD)	
Endpoint Specific:	Yes ▾
Enable (G.711, G.722, and G.726):	Disable ▾

Advanced Parameters

Configuring Codec Advanced Parameters

Steps

- 1) Go to **Media/Codecs**.
- 2) From the **Select Codec Bank**, choose if you want the G.722, the G.723.1, G.726 or G.729 codec.

Note: All Codec Banks include the T.38, the Clear Mode, the Clear Channel, and the X-CCD codecs.

- 3) In the **Codec** table, click  next to the codec you wish to configure.
- 4) From the **Select Endpoint** drop-down list, select **Default** to apply changes to all endpoints or select the specific **Endpoint** to apply changes to the selected endpoint.
- 5) Complete the fields as required.
- 6) Click **Apply**.

Result

This is an example for the G.729 Codec.

G.729		
Voice Transmission:	Enable ▼	
Voice Priority:	0	
Minimum Packetization Time:	30 ms ▼	
Maximum Packetization Time:	80 ms ▼	
Built-In Voice Activity Detection (VAD):	Enable ▼	

Mipt Default vs Specific Endpoint Configuration Examples

```
Global>Mipt.EpSpecificCodec
```

EpId	EnableConfig	GenericVoiceActivityDetection
FX01	Disable	Conservative
FX02	Disable	Conservative
FX03	Disable	Conservative
FX04	Disable	Conservative
FXS1	Disable	Conservative
FXS2	Disable	Conservative
FXS3	Disable	Conservative
FXS4	Disable	Conservative

```
Global>Mipt.epSpecificCodecG711Mulaw
```

EpId	EnableConfig	VoiceEnable	VoicePriority	DataEnable
FX01	Disable	Enable	0	Enable
FX02	Disable	Enable	0	Enable
FX03	Disable	Enable	0	Enable
FX04	Disable	Enable	0	Enable
FXS1	Disable	Enable	0	Enable
FXS2	Disable	Enable	0	Enable
FXS3	Disable	Enable	0	Enable
FXS4	Disable	Enable	0	Enable

EpId	DataPriority	MinPtime	MaxPtime
FX01	0	30	30
FX02	0	30	30
FX03	0	30	30
FX04	0	30	30
FXS1	0	30	30
FXS2	0	30	30
FXS3	0	30	30
FXS4	0	30	30

```
Global>Mipt.epSpecificCodecG711Mulaw[EpId=FXS1].DataPriority=10
Global>mipt.Restart
Global>Mipt.epSpecificCodecG711Mulaw
```

EpId	EnableConfig	VoiceEnable	VoicePriority	DataEnable
FX01	Disable	Enable	0	Enable
FX02	Disable	Enable	0	Enable
FX03	Disable	Enable	0	Enable
FX04	Disable	Enable	0	Enable
FXS1	Disable	Enable	0	Enable
FXS2	Disable	Enable	0	Enable
FXS3	Disable	Enable	0	Enable
FXS4	Disable	Enable	0	Enable

EpId	DataPriority	MinPtime	MaxPtime
FX01	0	30	30
FX02	0	30	30
FX03	0	30	30
FX04	0	30	30
FXS1	10	30	30
FXS2	0	30	30
FXS3	0	30	30
FXS4	0	30	30

```
Global>Mipt.EpSpecificCodec[EpId=FXS1].EnableConfig=Enable
Global>Mipt.EpSpecificCodec[EpId=FXS1].GenericVoiceActivityDetection=Transparent
Global>Mipt.EpSpecificCodec
```

EpId	EnableConfig	GenericVoiceActivityDetection
FX01	Disable	Conservative
FX02	Disable	Conservative
FX03	Disable	Conservative
FX04	Disable	Conservative
FXS1	Enable	Transparent
FXS2	Disable	Conservative
FXS3	Disable	Conservative
FXS4	Disable	Conservative

Online Help

If you are not familiar with the meaning of the fields and buttons, click **Show Help**, located at the upper right corner of the Web page. When activated, the fields and buttons that offer online help will change to green and if you hover over them, the description will be displayed.

DGW Documentation

Mediatrix devices are supplied with an exhaustive set of documentation.

Mediatrix user documentation is available on the [Media5 Documentation Portal](#).

Several types of documents were created to clearly present the information you are looking for. Our documentation includes:

- **Release notes:** Generated at each GA release, this document includes the known and solved issues of the software. It also outlines the changes and the new features the release includes.
- **Configuration notes:** These documents are created to facilitate the configuration of a specific use case. They address a configuration aspect we consider that most users will need to perform. However, in some cases, a configuration note is created after receiving a question from a customer. They provide standard step-by-step procedures detailing the values of the parameters to use. They provide a means of validation and present some conceptual information. The configuration notes are specifically created to guide the user through an aspect of the configuration.
- **Technical bulletins:** These documents are created to facilitate the configuration of a specific technical action, such as performing a firmware upgrade.
- **Hardware installation guide:** They provide the detailed procedure on how to safely and adequately install the unit. It provides information on card installation, cable connections, and how to access for the first time the Management interface.
- **User guide:** The user guide explains how to customise to your needs the configuration of the unit. Although this document is task oriented, it provides conceptual information to help the user understand the purpose and impact of each task. The User Guide will provide information such as where and how TR-069 can be configured in the Management Interface, how to set firewalls, or how to use the CLI to configure parameters that are not available in the Management Interface.
- **Reference guide:** This exhaustive document has been created for advanced users. It includes a description of all the parameters used by all the services of the Mediatrix units. You will find, for example, scripts to configure a specific parameter, notification messages sent by a service, or an action description used to create Rulesets. This document includes reference information such as a dictionary, and it does not include any step-by-step procedures.

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