

R2 CAS Configuration

For all PRI Mediatrix Units

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Basic Concepts

Channel Associated Signaling (CAS)

The Channel Associated Signaling (CAS) is a method of signalling where each traffic channel has a dedicated signaling channel.

In other words, the signalling for a particular traffic circuit is permanently associated with that circuit. Channel-associated call-control is still widely used today, mostly in South America, Africa, Australia, and in Europe. The Mediatrix unit uses the MFC/R2 CAS protocol. This is a compelled sequence multi-frequency code signaling. MFC/R2 can be used on international as well as national connections. In MFC/R2 signaling, the equipment units at the exchanges that send and receive digits, and the signaling between these units, are usually referred to as register and interregister signalling. The terms forwards and backwards are heavily used in descriptions of MFC/R2.

- Forwards is the direction from the calling party to the called party.
- Backwards is the direction from the called party to the calling party.

Interregister Signals

The interregister, or interswitch, signals in MFC/R2 signaling (defined in ITU-T Q.441) are encoded as the presence of 2, and only 2, out of 6 specific tones, spaced at 120 Hz intervals.

Two sets of tones are defined:

- one for forward signals
- one for backward signals

There are 15 combinations of 2 out of 6 tones i.e.:

- 10 signals for the digits 0 to 9
- additional signals available for supervisory purposes

MFC/R2 uses a separate set of frequencies for the forward and backwards directions. The interregister signals are sent in-band. They may pass transparently through several nodes in the network between the two terminating switches. The signals are arranged in groups. When a call begins, the calling end uses group I signals, and the called end uses group A. The called end may tell the calling end to switch to using group II and group B signals, or to switch back to group A. In some countries, there are also groups III and C, used for caller number transfer. Groups III and C do not exist in the ITU specifications. MFC/R2 uses a system called compelled signaling. To ensure the sending end never sends signals too fast, each signal from the sending end results in an acknowledgement from the receiving end. The sending end is instructed signal by signal what it should send next – a dialed digit, a digit of caller ID, etc.

For more details refer to the <https://www.itu.int/rec/T-REC-Q.400-Q.490-198811-I>

Line Signals for the Digital Version of MFC/R2

The MFC/R2 digital line signals (defined in ITU-T Q.421) are the ABCD bits of CAS in timeslot 16 of an E1.

They represent the states of the line, and are similar to the states of an analog line. In general, only bits A and B are used. In most systems, bits C and D are set to fixed values and never change. There are some national variants where bit C or D may be used for metering pulses.

R2 Auto-Configuration

The R2 Auto-configuration feature allows the detection and the configuration of a specific or of all R2 interfaces so that the R2 link goes up and becomes usable with a minimal user interaction.

When launching an auto-configuration process, it stops automatically when all selected interfaces have been tested. For each interface, the auto-configuration process is considered successful when the link becomes up or a failure when all combinations have been tried without having a link up.

During R2 Auto-Configuration, the following parameters are updated:

- PortPinout : TE / NT
- ClockMode : MASTER / SLAVE
- LineCoding : AMI / HDB3
- LineFraming : CRC4 / NOCRC4

R2 Preset Configurations

It is possible to save a set of configurations as presets for future R2 connections.

These preset files are located in the file system's persistent memory. They differ depending on the Mediatrix unit you are using. Using preset files is especially useful for units that do not use the default values provided by Media5.

Note: Only script files can be used as R2 Preset configuration.

It is also possible to export the current R2 configuration in a preset.

Note: User-defined preset files are not kept in the event of a factory reset.

Installed configuration scripts/images are listed in the DGW Web interface, under **Management/File**.

Basic Tasks

Configuring R2 CAS Parameters

Steps

- 1) Go to **R2/R2 Config**.
- 2) **Note:** The number of available interfaces depends on the Mediatrix unit model.
- 3) In the **Interface Configuration** configure the fields as required.

Result

Interface Configuration	
Clock Mode:	Slave ▼
Port Pinout:	Auto ▼
Monitor Link State:	Enable ▼
Line Coding:	HDB3 ▼
Line Framing:	CRC4 ▼
Channel Range:	1-30
Channel Allocation Strategy:	Ascending ▼
Maximum Active Calls:	0
Encoding Scheme:	G.711 a-Law ▼
Line Signaling Protocol:	Q.421 2 Bits Signaling ▼
Incoming Digit Signaling:	MFC/R2 ▼
Outgoing Digit Signaling:	MFC/R2 ▼
Country Selection:	BrazilR2 ▼
Digit Attenuation:	0

Setting the Mediatrix Unit to Use the R2 Signaling Protocol

Before you start

R2 signaling protocol can only be used on E1 line type.

Steps

- 1) Go to **System/Hardware**.
- 2) In the **PRI Cards Configuration** table, from the **Signaling** selection list, located on the same line as the port you wish to dedicate to R2 signaling, choose **R2**.

Note: When changing from R2 to ISDN or ISDN to R2, you must change your routes accordingly (Call Router/Route Config).

- 3) From the **Line Type** selection list, make sure **E1** is selected.
- 4) Click **Apply**.
- 5) Restart the unit.

Result

PRI Ports Configuration			
Port	Line Type	Signaling	
Slot1/E1T1	E1 ▾	Isdn ▾	
Slot2/E1T1	E1 ▾	R2 ▾	

Auto-Configuring R2 Interfaces

Information

Launching the auto-configuration may terminate abruptly all ongoing R2 calls.

Steps

- 1) Go to **R2/Status**.
- 2) In the **Automatic Configuration** table, from the selection list, choose the interfaces to auto-configure.
- 3) Click **Start Sensing**.

Result

Auto-configuration on all R2 interfaces may take some time to complete. Some of the current R2 settings might be replaced by new values.

Automatic Configuration	
Status:	--- All --- ▾ Start Sensing
Last Result:	None

Saving an R2 Preset Configuration

Information

It is a best practice to export the R2 configuration before performing a factory reset or a partial reset, as user-defined presets are deleted.

Steps

- 1) Go to **R2/Status**.
- 2) In the **Preset Name** field, enter the name of the R2 configuration you wish to save.
- 3) Click **Save**.

Result

The R2 configuration will be exported and available under **Management/File**. The file will also be available under the **Suggestion** list.

R2 Preset Configuration		
Local Preset:	--- Suggestion ---	Apply
Preset Name:		Save

Using an R2 Preset Configuration

Information

Remember that the Preset configuration must first be imported in the file management system under **Management/File**.

Steps

- 1) Go to **R2/Status**.
- 2) In the **R2 Preset Configuration** table, from the **Suggestion** list, choose the Preset to apply.
- 3) Click **Apply**.

Result

The values of the parameters included in the R2 Preset configuration will be applied to the Mediatrix unit.

R2 Preset Configuration		
Local Preset:	--- Suggestion ---	Apply
Preset Name:		Save

Advanced Configuration Tasks

Overriding Country Default R2 Signaling Variants

Steps

- 1) Go to **R2/Signaling**.
- 2) From the **Select Interface** selection list, choose an interface.

Note: The number of available interfaces depends on the Mediatrix unit model.

- 3) In the **Country** table, from the **Override Default Country Settings** selection list, choose **Enable**.
- 4) Click **Reset to Default** to update the values with the selected country.

Note: Once the **Override Default Country Settings** is enabled, the indicated values in the table are not from the specified country in the **Country Selection** field. To get the appropriate values of the selected country, you must reset the table values first.

- 5) When prompted to, restart required services.
- 6) In the **R2 Signaling Variants**, complete the fields as required.
- 7) Click **Apply**.
- 8) Again, when prompted to, restart required services.

Result

Country	
Country Selection:	BrazilR2
Override Default Country Settings:	Enable ▾

R2 Signaling Variants	
Parameters	Value
Bits CD:	1
ANI Length:	0
DNIS Length:	0
ANI Request:	Enable ▾
Send ANI request after nth DNIS Digits:	0
Collect Call Blocked:	Enable ▾
ANI Category:	Nat Subscriber NoPri ▾
Line Free Category:	Line Free Charge ▾
ANI Restricted:	Enable ▾
Incoming Decline Method:	Release ▾

Overriding Country Default R2 Timers Variants

Before you start

Modifying the default values of the Timers Variants should be performed by qualified technicians unless you are an expert in R2 CAS protocol.

Steps

- 1) Go to **R2/Timers**.
- 2) From the **Select Interface** selection list, choose an interface.

Note: The number of available interfaces depends on the Mediatrix unit model.

- 3) In the **Country** table, from the **Override Default Country Settings** selection list, choose **Enable**.

- 4) Click **Reset to Default** to update the values with the selected country.

Note: Once the **Override Default Country Settings** is enabled, the indicated values in the table are not from the specified country in the **Country Selection**. To get the appropriate values of the selected country, you must reset the table values first.

- 5) When prompted to, restart required services.
- 6) In the **R2 Timers Variants**, complete the fields as required.

Note: Changing a timeout value could require to adjust other timeout values in R2 Timers Variants and R2 Digit Timers Variants. Refer to the parameter description for more details.

- 7) Click **Apply**.
- 8) Again, when prompted to, restart required services.

Result

Country		
Country Selection:	BrazilR2	
Override Default Country Settings:	Enable Disable	

R2 Timers Variants		
Parameters	Value	
Seizure Ack Timeout:	2000	
Fault Seizure Ack Timeout:	60000	
Double Seizure Timeout:	100	
Double Answer Timeout:	1500	
Answer Timeout:	0	
ReAnswer Timeout:	1000	
Release Guard Timeout:	100	
InterCall Guard Timeout:	100	
Congestion Tone Guard Timeout:	1000	
Unblocking Timeout:	100	
Address Complete Timeout:	8000	
Wait Answer Timeout:	60000	
Digit Complete Timeout:	4000	
Wait GroupB Response Complete Timeout:	3000	
Wait Immediate Response Complete Timeout:	1000	
Play Tone Guard Timeout:	70	
Accept Call Timeout:	2000	
Clear Forward Guard Timeout:	1500	
Clear Backward Guard Timeout:	1500	
Fault On Answered Guard Timeout:	250	
Fault On Clear Backward Guard Timeout:	250	
Fault On Seize Ack Guard Timeout:	250	
Fault On Seize Guard Timeout:	250	
Decline Guard Timeout:	1500	
No Digit Timeout:	0	

Overriding Country Default R2 Digit Timers Variants

Before you start

Modifying the default values of the Digit Timers Variants should be performed by qualified technicians unless you are an expert in R2 CAS protocol.

Steps

- 1) Go to **R2/Digit Timers**.

- 2) From the **Select Interface** selection list, choose an interface.

Note: The number of available interfaces depends on the Mediatrix unit model.

- 3) In the **Country** table, from the **Override Default Country Settings** selection list, choose **Enable**.
- 4) Click **Reset to Default** to update the values with the selected country.

Note: Once the **Override Default Country Settings** is enabled, the indicated values in the table are not from the specified country in the **Country Selection**. To get the appropriate values of the selected country, you must reset the table values first.

- 5) In the **R2 Digit Timers Variants**, complete the fields as required.

Note: Changing a timeout value could require to adjust other timeout values in R2 Timers Variants and R2 Digit Timers Variants. Refer to the parameter description for more details.

- 6) Click **Apply**.

Result

For example:

Country		
Country Selection:	BrazilR2	
Override Default Country Settings:	Enable	

R2 Digit Timers Variants		
Parameters	Value	
MFC Pulse Inter Digit Timeout:	100	
MFC Pulse Min On Timeout:	150	
MFC Max Sequence Timeout:	10000	
MFC Max On Timeout:	5000	
MFC Max Off Timeout:	5000	
MF Congestion Tone Duration:	0	

Overriding Country Default Link Timers Variants

Steps

- 1) Go to **R2/Link Timers**.

- 2) From the **Select Interface** selection list, choose an interface.

Note: The number of available interfaces depends on the Mediatrix unit model.

- 3) In the **Country** table, from the **Override Default Country Settings** selection list, choose **Enable**.
- 4) Click **Reset to Default** to update the values with the selected country.

Note: Once the **Override Default Country Settings** is enabled, the indicated values in the table are not from the specified country in the **Country Selection**. To get the appropriate values of the selected country, you must reset the table values first.

- 5) In the **R2 Link Timers Variants**, complete the fields as required.
- 6) Click **Apply**.

Result

Country	
Country Selection:	BrazilR2
Override Default Country Settings:	Enable v

R2 Link Timers Variants	
Parameters	Value
Link Activation Timeout:	1000
Link Activation Retry Timeout:	3000

Overriding Country Default Tone Variants

Steps

- 1) Go to **R2/Tones**.
- 2) From the **Select Interface** selection list, choose an interface.

Note: The number of available interfaces depends on the Mediatrix unit model.

- 3) In the **Country** table, from the **Override Default Country Settings** selection list, choose **Enable**.
- 4) Click **Reset to Default** to update the values with the selected country.

Note: Once the **Override Default Country Settings** is enabled, the indicated values in the table are not from the specified country in the **Country Selection**. To get the appropriate values of the selected country, you must reset the table values first.

- 5) When prompted to, restart required services.

- 6) In the **R2 Tones Backward Groups** and **R2 Tones Forward Groups**, complete the fields as required.

Note: For more details on Forward tones/groups and Backward tones/groups, refer to the [Interregister Signals](#) (p.4) section.

- 7) Click **Apply**.
- 8) Again, when prompted to, restart required services.

Result

Country		
Country Selection:	BrazilR2	
Override Default Country Settings:	Enable ▾	

R2 Tones Forward Groups	Value	
End of DNIS Tone:	I15 ▾	
End of ANI Tone:	I15 ▾	
Restricted ANI Tone:	I12 ▾	

R2 Tones Backward Groups	Value	
Send Next DNIS Digit Tone:	A15 ▾	
Send Previous DNIS Digit Tone:	A15 ▾	
Switch to Group II Tone:	A15 ▾	
Network Congestion Tone:	A15 ▾	
Send Calling Party Category Tone:	A15 ▾	
Immediate Accept Tone:	A15 ▾	
Send DNIS Digit N-2 Tone:	A15 ▾	
Send DNIS Digit N-3 Tone:	A15 ▾	
Repeat all DNIS Tone:	A15 ▾	
Send Next ANI Digit Tone:	A15 ▾	
Send Calling Party Category Tone switch to Group C:	A15 ▾	
Send Special Information Tone:	B15 ▾	
User Busy Tone:	B15 ▾	
Network Congestion Tone:	B15 ▾	
Unassigned Number Tone:	B15 ▾	
Line Free with Charge Tone:	B15 ▾	
Line Free with Charge Tone (Supplementary):	B15 ▾	
Line Free without Charge Tone:	B15 ▾	
Line Out of Order Tone:	B15 ▾	
Changed Number Tone:	B15 ▾	
Send Next ANI Digit Tone:	C15 ▾	
Repeat all DNIS Tone switch to Group A:	C15 ▾	
Send Next DNIS Digit Tone switch to Group A:	C15 ▾	
Network Congestion Tone:	C15 ▾	
Send Previous DNIS Digit Tone switch to Group A:	C15 ▾	
Switch to Group II Tone:	C15 ▾	

Advanced R2 CAS Parameters

The PRI statistics are available in the **Hardware.StatsInfo** table. To reset the statistics, you must set "ResetStats" in the **Hardware.StatsInfo.ResetStats** parameter.

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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