



Media Redundancy Protocol (MRP)

```

>mrp domain role set 1 manager
>mrp domain show 1
Operational:
  Status:           Disabled
  Ring State:       Undefined
  Primary Ring Port State: Disabled
  Secondary Ring Port State: Disabled
Domain:
  Admin Role:       Manager
  Name:             domain1
  UUID:            ffffffff
  Primary Ring Port ID: 4
  Secondary Ring Port ID: 5
  VLAN ID:         0
Manager:
  Priority:         0
  Topology Change Interval, ms: 2
  Topology Change Repeat Count, ms: 3
  Short Test Interval, ms: 3
  Default Test Interval, ms: 5
  Test Monitoring Count: 5
  Test Monitoring Extended Count: 1
  Non-blocking MRC supported: 1
  React On Link Change: 1
  Check Media Redundancy Event: 1
  
```

TRANSITION NETWORKS S3280 Carrier Ethernet Network Interface Device

Configuration Monitor

- System
- Thermal Protection
- Ports
- Link OAM
- Security
- LACP
- Loop Protection
- Spanning Tree
- MVR
- IPMC
- LLDP
- Ethernet Services
- PTP
- MAC Table
- VLANs
- VCL
- sFlow
- Diagnostics
- Maintenance

Domain Profile Auto-refresh Refresh Clear

Name	Oper. Role	Ring State	Primary		Secondary	
			Port	State	Port	State
Domain 1	Manager	Closed	Port 1	Forwarding	Port 2	Blocked

Domain Events

Timestamp	Name	Event	Appear
09/10/2012 - 14:36:00	Domain 1	Ring Open	True
09/10/2012 - 15:06:00	Domain 1	Ring Open	False
09/10/2012 - 16:01:30	Domain 1	Multiple Managers	True
09/10/2012 - 16:01:35	Domain 1	Ring Open	True

Domain Statistics

Domain	MRP Frames Transmitted		MRP Frames Received			Round Trip Delay, ms	
	Total	Error	Total	Error	Unrecognized	Min	Max
Domain 1	1000	990	0	0	0	1	50

User Guide

33541 Rev. A

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Media Redundancy Protocol (MRP) User Guide, 33541 Rev. A

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1. Introduction

IEC 62439-2 is the Industrial communication networks – High availability automation networks – Part 2: Media Redundancy Protocol (MRP). In the fault-free state of the network, the IEC 62439 series protocols provide ISO/IEC 8802-3 (IEEE 802.3) compatible, reliable data communication, and preserve determinism of real-time data communication. In cases of fault, removal, and insertion of a component, they provide deterministic recovery times. These protocols fully retain the typical Ethernet communication capabilities as used in the office world, so that the software involved remains applicable.

IEC 62439-2 has been an International standard (IEC 62439) since March 2008. It was developed by Hirschmann in 1998 and called HiperRing™. In Switched Ethernet networks in ring topology, it provides for guaranteed failover times of < 200ms / < 500ms. MRP is a Data Link Layer protocol on top of the Ethernet MAC layer. MRP uses mechanisms similar to RSTP (e.g., delete forwarding database after reconfiguration, set ports into blocking or forwarding mode).

MRP defines a Redundancy Manager (MRM) and Redundancy Clients (MRCs). In an MRP ring, one switch is the Media Redundancy Master (MRM) and all others are the Media Redundancy Clients (MRC). The MRM sends a test frame (*MRP_Test*) in both directions throughout the ring. These test frames are marked with a special MAC address and forwarded by the MRCs only in the ring. They are sent with a delay of *TSTDefaultT* (proposed at 20 ms). If the *MRP_Test* frames arrive on both ends back to the MRM, the ring is detected as closed and the MRM opens the ring. This is done by changing the state to *BLOCKED* at one of the ring ports in the MRM and the other as *FORWARDING*. On this *BLOCKED* port, only test frames to supervise the ring (*MRP_Test*) and other management frames such as LLDP (Link Layer Discovery Protocol) are sent. Data frames are sent by the MRM only on the port in the *FORWARDING* state.

Comparison of Failover Times

Protocol / Standard	Typical Re-config Time	Topology Notes	Initial Availability
STP (Spanning Tree) IEEE802	30 seconds	Any topology / mesh, diameter limited	1990
RSTP (Rapid Spanning Tree) IEEE802.1	2 seconds	Any topology / mesh, diameter limited	2001 / 2004
MRP (Media Redundancy Protocol) IEC 62439	200ms, 500ms (50 switches)	Any topology / mesh, ring	Pre-standard 'HiperRing' since 1998; MRP since 2007

Related Manuals and Online Help

This manual is one of several related manuals which can include:

- Product Documentation Postcard, 33504
- INDURA™ Switch Install Guide (33541), Web User Guide (33508), CLI Reference (33510)
- Converge™ EMS Administrator's Guide (33533), Install Guide (33543), Admin Procedures (33544)
- RFC2544 User Guide (33540)
- Static IP Routing User Guide (33542)
- MRP User Guide (33541) (this manual)
- Release Notes (version specific)

Context-sensitive Help screens are built into the Web interface (click ) and the CLI (type ? or **Help**).

The TN web site at www.transition.com/ has additional white papers, application notes, etc.

The Indura landing page at www.transition.com/TransitionNetworks/Landing/indura/indura.aspx has Product Information, Application Notes, etc.

The Indura product page at www.transition.com/TransitionNetworks/Products2/Family.aspx?Name=Indura has access to the latest Indura datasheet, Features, Applications, Specs, SKUS, etc.

When the procedures in this manual are successfully completed, refer to the Indura Web Interface User Guide or the Indura CLI Reference for configuration, monitoring, diagnostics, and maintenance information.

System Functions

The Media Redundancy Protocol (MRP) specifies a recovery protocol based on a ring topology. One of the nodes has the role of a media redundancy manager (MRM). The function of the MRM is to observe and to control the ring topology in order to react on network faults. The other nodes in the ring have the role of media redundancy clients (MRC). An MRC reacts on received reconfiguration frames from the MRM and can detect and signal link changes on its ring ports.

The Media Redundancy Protocol (MRP) functions can be performed from the CLI or web interface; see section 3. [CLI \(Command Line Interface\)](#) or section 4. [Web Interface](#) for details.

Prerequisites and Restrictions

TN support for IEC62439-2 includes:

- Multiple redundancy domains configuration support per device.
- Redundancy domain is VLAN aware (optional but recommended).
- Single MRM per ring.
- Proprietary MIB to support configuration of additional MRM/MRC attributes and statistics.
- Protocol counters, statuses and statistics.
- Protocol follows a modular component architecture.
- MRP is not compatible with Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocols (RSTP). STP must be turned off in the Indura switch.
- By default the device configures only two MRP domains.
- The Multiple MRM in a single ring function is not supported. If there are two MRMs in one ring, then both MRMs are generated by the event *MULTIPLE_MANAGERS*. The multiple active MRMs cause the ring to an incorrect state. The operator should switch all active MRMs to the MRC state except one MRM to fix this situation.

See the IETF website at http://webstore.iec.ch/webstore/webstore.nsf/Artnum_PK/43822 for more information.

2. System Description

The MRP (Media Redundancy Protocol) specifies a recovery protocol based on a ring topology. MRP is designed to react deterministically on a single failure of an inter-switch link or switch in the network. During the failure of a connection the media redundancy reconfigures the network within maximum 200ms so that the nodes can be accessed again via a substitute path.

Structure of a Ring Topology

The starting point for the ring redundancy method is a ring topology. Nodes of a ring topology can be switches or communication modules. One device in the network takes on the role of the *redundancy manager* (MRM), the other nodes are the *redundancy clients* (MRC). The ports at a node which are connected with the subsequent or preceding node are named *ring ports*.

The figure below shows the structure of a ring topology:

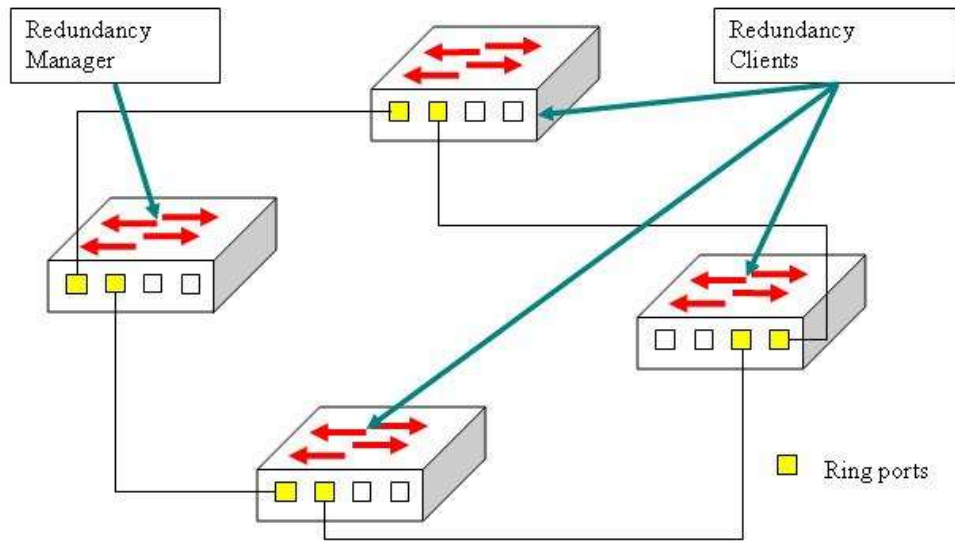


Figure 1. MRP Ring Topology with One Manager and Three Clients

MRP Functions

It is the Redundancy Manager's responsibility to monitor the ring topology. During normal ring operation (i.e., without ring interruption due to an error) the Redundancy Manager disconnects one of its ring ports so that the ring topology becomes 'loop free' from a communication point of view.

As soon as the ring is open due to the failure of a node, and the data communication is broken, the Redundancy Manager reconfigures the data paths within 200ms. It enables the disconnected ring port and creates a new loop free topology.

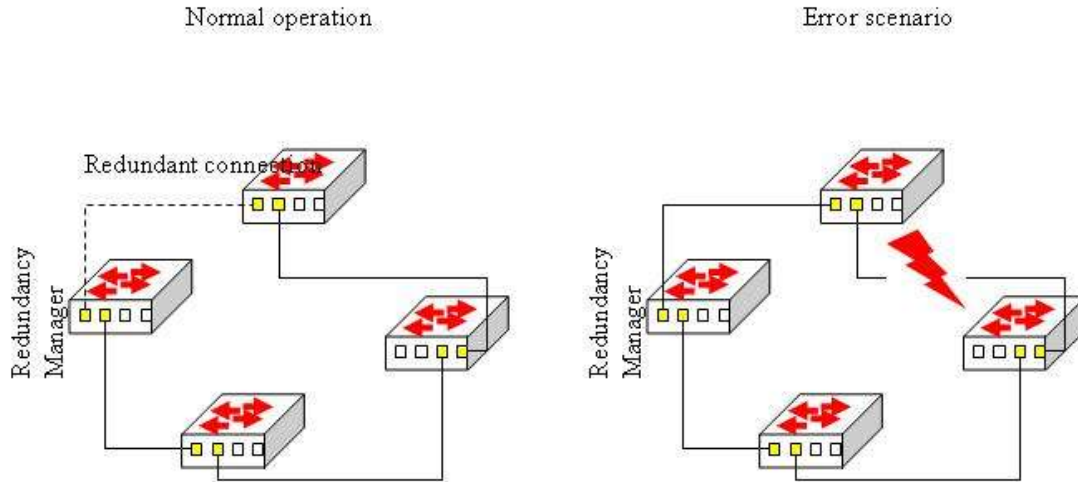


Figure 2. Operational Modes

Normal Operation

In order to detect errors in the network, the redundancy manager sends test frames on both of its ring ports. These frames run through the ring in both directions until they arrive at the other ring port of the manager. These test frames are marked with a special MAC address and forwarded by the MRCs only to the opposite ring ports. They are sent periodically every *MRP_TSTdefaultT* interval (20 ms by default). If the *MRP_Test* frames arrive on both ends back to the MRM, the ring is detected as defect free and the MRM blocks the loop. This is done by changing the state to *BLOCKED* at one of the ring ports in the MRM and the other as *FORWARDING* as shown in Figure 3 below. On this *BLOCKED* port only test frames to supervise the ring (*MRP_Test* frames) are sent. Data frames are sent by the MRM only on the port in the *FORWARDING* state.

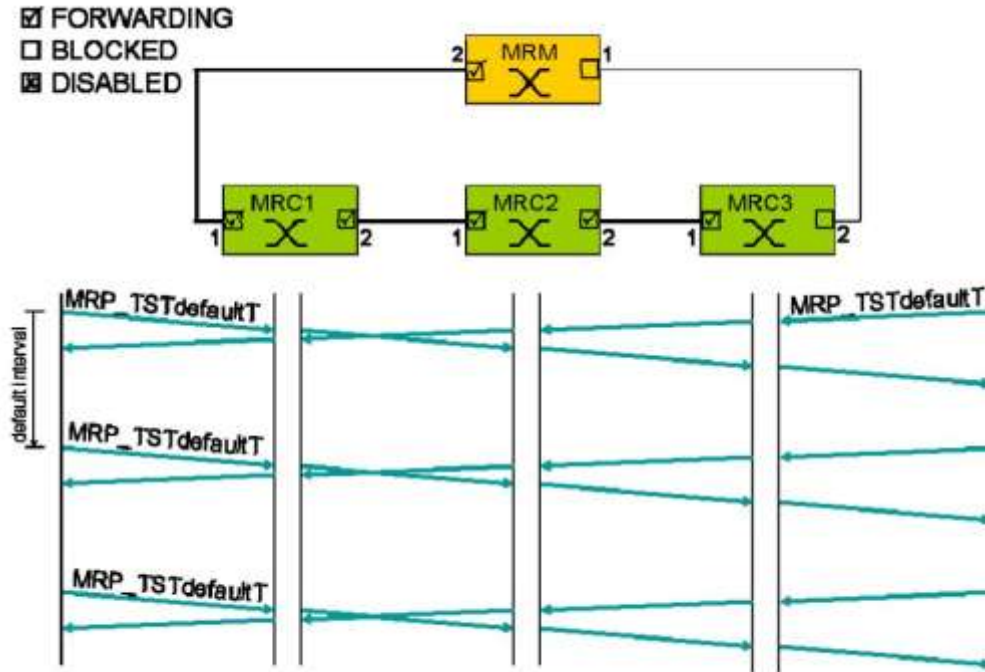


Figure 3. Normal Operation (ref. Fig. 2)

Failure Detection

If *MRP_TSTNRmax* test frames in sequence are not received by the MRM, the ring topology is considered as interrupted. The *MRP_TSTNRmax* counter is typically set to three, so it takes 60 ms to detect a failure in the ring.

To change the topology in the whole ring, all MRCs and the MRM have to clear their FDBs at the same time as the redundant port is changing state from **BLOCKED** to **FORWARDING** to keep the network consistent. The MRM sends several *MRP_TopologyChange* messages into the ring with the indication that the topology has changed and this will take effect within a certain delay. The number of *MRP_TopologyChange* messages needed and the delay between these messages are configurable.

Typical value of delay (*MRP_TOPchgT*) is 20 ms and the retries (*MRP_TOPNRmax*) default is 3.

The blocked port on the MRM changes the state from **BLOCKING** to **FORWARDING**. Every MRC receiving *MRP_TopologyChange* indications is supposed to clear its Filtering Data Base (FDB) at the *MRP_TOPchgT* time. Afterwards it has to build up again the FDB based on the new topology.

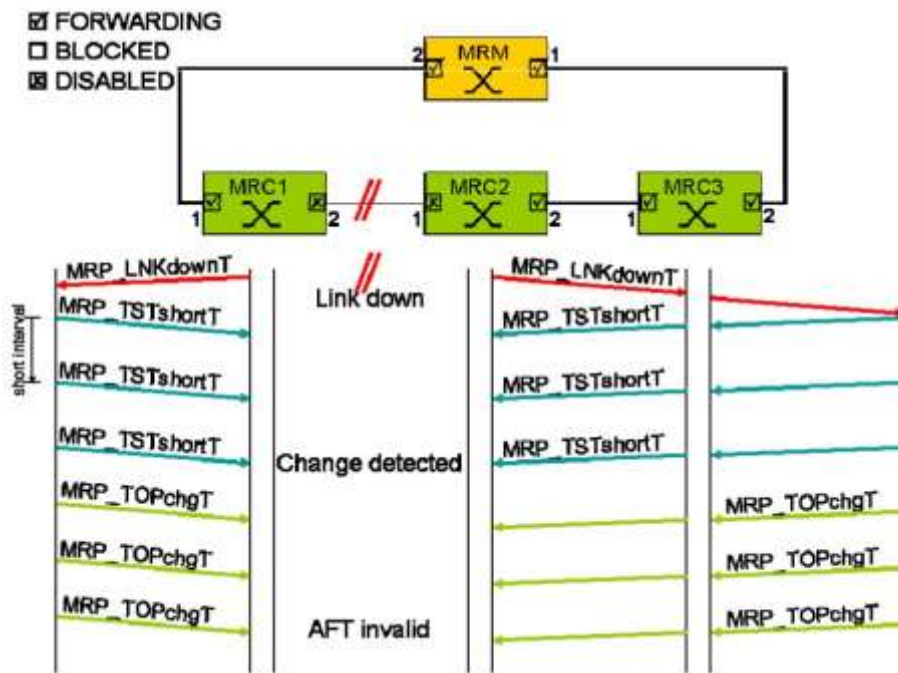


Figure 4. Failure Detection (ref. Fig. 2)

The time between detecting a ring interruption and restoring a new data structure is referred to as the reconfiguration time. The reconfiguration time has a maximum value of 200ms.

As soon as the fault is recovered in the network, the redundancy manager disconnects its ring port again and informs the clients of the change.

Configuration Model

MRP Ring Configuration Parameters

An MRP ring contains the following attributes:

- **Domain** - All devices in a ring which are configured with MRP must be part of the same redundancy domain. The domain is identified by *Domain* or *DomainName*.
- **Domain** – A universally unique identifier belonging to the MRP domain which represents a ring.
- **DomainName** – A unique logical name for the MRP domain to ease the management of MRP domains.
- **Role** - There are two role options available:
 - Manager (the device becomes the redundancy manager, MRM) and
 - Client (the device becomes the redundancy client, MRC).
- **Ring ports** - The MRM and the MRC will have two ring ports. The MRM and MRC will not forward *MRP_Test* frames, *MRP_TopologyChange* frames, and *MRP_LinkChange* frames on non-ring ports. Additional ring ports may be used to connect to other ring.
The ring ports have following names:
 - Primary – The first ring port (Port which first becomes to the Link UP state).
 - Secondary – The second ring port.
- **VLAN ID** - An optional attribute that may be used by the MRP object to specifies its VLAN identifier in the redundancy domain.
- **Ring State** - This attribute specifies the actual ring state of the MRP object in the redundancy domain. The Ring State has one of the following values:
 - Open: Ring is open due to link or MRC failure in ring, or
 - Closed: Ring is closed (normal operation, no error).

MRM (Media Redundancy Manager) Parameters

Table 1. MRM Parameters

Parameter	Min	Max	Default	Meaning
<i>MRP_TOPchgT</i>	1ms	20ms	10ms	Topology Change Request Interval (Clear Address Table) - This attribute specifies the interval for sending <i>MRP_TopologyChange</i> frames.
<i>MRP_TOPNRmax</i>	1	5	3	Topology Change Repeat Count (Clear Address Table) - This attribute specifies the interval count which controls repeated transmissions of <i>MRP_TopologyChange</i> frames.
<i>MRP_TSTshortT</i>	1ms	30ms	10ms	Short Test Interval - This attribute specifies the short interval for sending <i>MRP_Test</i> frames on ring ports after link changes in the ring.
<i>MRP_TSTdefaultT</i>	1ms	50ms	20ms	Default Test Interval - This attribute specifies the default interval for sending <i>MRP_Test</i> frames on ring ports.
<i>MRP_TSTNRmax</i>	1	5	3	Test Monitoring Count - This attribute specifies the interval count for monitoring the reception of <i>MRP_Test</i> frames.
<i>MRP_TSTExtNRmax</i>	1	15	10	Test Extended Monitoring Count (optional) - This optional parameter contains the value of the extended interval count for monitoring the reception of <i>MRP_Test</i> frames.

Table 2. Additional MRM Parameters

Parameter	Min	Max	Default	Meaning
Manager Priority	0	15	8	The attribute contains the priority of the MRM. 0 - Highest priority redundancy manager. 15 - Lowest priority redundancy manager.
Non-blocking MRC supported	Yes / No		No	This attribute specifies the ability of the MRM to support MRCs without <i>BLOCKED</i> port state support in the ring.
React On Link Change	Yes / No		No	This optional attribute specifies whether the MRM reacts on <i>MRP_LinkChange</i> frames or not.
Check Media Redundancy	Yes / No		Yes	This attribute specifies whether monitoring of MRM state is enabled or disabled in the redundancy domain.

MRC (Media Redundancy Client) Parameters

Table 3. MRC Parameters

Parameter	Min	Max	Default	Meaning
<i>MRP_LNKdownT</i>	1ms	50ms	20ms	Link Down Timer interval - This attribute specifies the interval for sending <i>MRP_LinkDown</i> frames on ring ports.
<i>MRP_LNKupT</i>	1ms	50ms	20ms	Link Up Timer interval - This attribute specifies the interval for sending <i>MRP_LinkUp</i> frames on ring ports.
<i>MRP_LNKNRmax</i>	1	10	4	Link Change (Up or Down) count - This attribute specifies the <i>MRP_LinkChange</i> frame count which controls repeated transmission of <i>MRP_LinkChange</i> frames

Table 4. Additional MRC Parameters

Parameter	Min	Max	Default	Meaning
BLOCKED state supported	Yes / No		Yes	This attribute specifies whether the MRC supports <i>BLOCKED</i> state at its ring ports or not.

MRP Events

Diagnostic event - In a redundancy domain the following diagnosis events handling are implemented by each MRM.

- If a device is configured as MRM, but not operating in the manager role, it will signal a “*MANAGER_ROLE_FAIL*” diagnosis event and suspend reporting of all other media redundancy diagnosis events while not in the manager role.
- If a device is operating in Manager role and this device detects another active MRM, it will signal the “*MULTIPLE MANAGERS*” event. This event can occur concurrently with the ring state event “*RING_OPEN*”.
- If a device is operating in Manager role and detects an open ring, it will signal the “*RING_OPEN*” event.

Diagnostic events are stored in the system log messages and also can be shown with CLI, web GUI, and SNMP. All diagnostic events are stored with a timestamp. Only the last 10 events are stored in the MRP module. They can be cleared the CLI, web GUI, and SNMP. Events are cleared after the device is reset.

L2 Frames

MRP messages are always sent to the specific MAC address with the OUI = 00-15-4E.

Note the following group addresses:

- 01-15-4E-00-00-01 MC_Test – is used for test messages.
- 01-15-4E-00-00-02 MC_Control – is used for status messages.

The TYPE field in the Ethernet frame is fixed to 0x88E3.

The Source MAC address contains the MAC address of the sending switch port.

A summary of the Ethernet frame is shown below:

PRE	SFD	DA	SA	TYPE	MRP_DATA	PAD	FCS
7 Bytes	1 Byte	6 Bytes	6 Bytes	2 Bytes	46 - 1500 Bytes		4 Bytes
		01-15-4E-00-00-01 01-15-4E-00-00-02	Port MAC Address	0x88E3			

3. CLI (Command Line Interface) Commands

The Indura MRP module can be configured and monitored via CLI commands as explained in this section.

The MRP CLI is for experienced network administrators who are responsible for configuring and maintaining the Indura. The CLI offers a comprehensive set of management features for use during initial setup (set IPs, etc.) and troubleshooting, as well as for day-to-day management (device management, firmware upgrades, managing security features, etc.).

The Indura offers a rich set of commands through its CLI for performing configuration and status monitoring. The CLI is accessible through the RS-232 serial console, telnet and SSH. The CLI incorporates user authentication for security purposes. The CLI interface can be accessed via Secure Shell (SSH) interface. This provides a more secure interface as SSH uses public-key cryptography for authentication. When the SSH server is enabled, normal telnet access can be enabled or disabled to avoid potential security holes.

This section describes the CLI commands used to create, enable, and check the MRP protocol. All of the other CLI commands and their functions are described in the Indura CLI Reference Guide manual.

The set of MRP CLI commands is shown below.

```
>mrp ?
```

```
Available Commands:
```

1. **MRP Domain new** <domain> [<name>] [<uuid>]
2. **MRP Domain delete** <domain>
3. **MRP Domain modify** <domain> [<name>] [<uuid>]
4. **MRP Domain show** <domain>
5. **MRP Domain diag show** <domain>
6. **MRP Domain diag clear** <domain>
7. **MRP Domain ringport add** <domain> primary|secondary <port>
8. **MRP Domain ringport delete** <domain> primary|secondary
9. **MRP Domain ringport show** <domain> [primary|secondary]
10. **MRP Domain role set** <domain> manager|client
11. **MRP Domain status** <domain> enable|disable
12. **MRP Domain vlan set** <domain> <vlanid>
13. **MRP Manager priority set** <domain> <priority>
14. **MRP Manager topologychange set** <domain> <interval> [<count>]
15. **MRP Manager test interval set** <domain> <default> [<short>]
16. **MRP Manager test monitoring set** <domain> <count> [<extcount>]
17. **MRP Manager nonblocking supported set** <domain> enable|disable
18. **MRP Manager linkchangereact set** <domain> enable|disable
19. **MRP Manager monitor set** <domain> enable|disable
20. **MRP Client link interval set** <domain> <down> <up> [<count>]
21. **MRP Client blockedstate set** <domain> enable|disable

```
>
```

The MRP Redundancy CLI commands can be categorized as:

- MRP commands
- MRP Manager commands
- MRP Client commands
- Related commands

The MRP Redundancy CLI commands are categorized below:

MRP Commands

1. Create Redundancy Domain
2. Delete Redundancy Domain
3. Modify Redundancy Domain
4. Configure MRP Status
5. Add Ring Port
6. Delete Ring Port
7. Display Ring Port
8. Configure Role
9. Configure VLAN ID
10. Display MRP State
11. Display MRP Events and Diagnostic Status
12. Clear MRP Events

MRP Manager Commands

13. Configure Priority
14. Configure Topology Change Interval and Repeat Count
15. Configure Short Test Interval and Default Test Interval
16. Configure Test Monitoring Count
17. Configure Non-blocking MRC supported
18. Configure React on Link Change
19. Configure Check Media Redundancy monitoring

MRP Client Commands

20. Configure Link Up Interval, Link Down Interval and Link Change Count
21. Configure Blocked State Supported

Related Commands

Note that the **Help (?)**, **Sys Ver**, **Sys Config** and **Ethersat** commands are changed for the MRP feature. The changes are described below.

Command: **Help (?)**

Syntax: **help or ?**

Description: Displays the set of supported CLI commands.

Example:

```
>help
General Commands:
-----
Help/?: Get help on a group or a specific command
Up   : Move one command level up
Logout: Exit CLI

Command Groups:
-----
System      : System settings and reset options
Conf        : Configuration management
FRA         : Fault Relay Alarm
Loop        : Loop Protection
IP          : IP configuration and Ping
Port        : Port management
MAC         : MAC address table
VLAN        : Virtual LAN
PVLAN       : Private VLAN
Security    : Security management
STP         : Spanning Tree Protocol
Aggr        : Link Aggregation
LACP        : Link Aggregation Control Protocol
LLDP        : Link Layer Discovery Protocol
EEE         : Energy Efficient Ethernet
Thermal     : Thermal Protection
EVC         : Ethernet Virtual Connections
EPS         : Ethernet Protection Switching
MEP         : Maintenance entity End Point
QoS         : Quality of Service
Mirror      : Port mirroring
Firmware    : Download of firmware via TFTP
PTP         : IEEE1588 Precision Time Protocol
MVR         : Multicast VLAN Registration
ERPS        : Ethernet Ring Protection Switching
LOAM        : Ethernet Link OAM
Loop Protect: Loop Protection
IPMC        : MLD/IGMP Snooping
sFlow       : sFlow Agent
VCL         : VLAN Control List
SIR         : Static IP Routing
MRP         : Media Redundancy Protocol

Type '<group>' to enter command group, e.g. 'port'.
Type '<group> ?' to get list of group commands, e.g. 'port ?'.
Type '<command> ?' to get help on a command, e.g. 'port mode ?'.
Commands may be abbreviated, e.g. 'por co' instead of 'port configuration'.
>
```


Command: **System Version**
Syntax: **system version**
Description: Display the current system version and build information.
Example: **>sys ver**

```
Version      : IND-3284 (standalone) 1.5.4
Build Date   : 2013-04-19T15:50:37-05:00
>
```

Command: **System Configuration**
Syntax: **system configuration**
Description: Display the current system configuration information.
Example: **>sys config**

```
System Contact :
System Name    :
System Location :
MAC Address    : 00-c0-f2-00-00-01
Software ID    : IND-3284
Product ID     :
Serial #       :
Board Rev      : 2
Chip ID        : VSC7428 Rev. B
System Time    : 1970-01-01T00:11:58+00:00
System Uptime  : 00:11:58
Software Version: IND-3284 (standalone) 1.5.4
Software Date  : 2013-04-19T15:50:37-05:00
Previous Restart: Cool
>
```

Ethersat Commands

The **Ethersat** commands are disabled when using these **MRP** commands. Entering an Ethersat command displays an error message:

```
>ethersat loop config
FPGA is not present
>ethersat
Invalid command
>
```

MRP Commands

Command: Create New Redundancy Domain

Syntax: `mrp domain new <domain> <name> [<uuid>]`

Description: Create and configure a new redundancy domain, where:
 <domain>: Domain ID – an integer (1-2) of the new redundancy domain.
 <name> : Domain name – a string (up to 240 symbols) of the new redundancy domain.
 The Domain Name attribute defines the redundancy domain representing the ring the Media redundancy object belongs to. It is set to default Domain Name or provided as unique ID by default.
 <uuid> Domain UUID – String in hexadecimal format: xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.
 This key attribute defines the redundancy domain representing the ring the MRP object belongs to. It is set to default Domain ID or provided as unique ID by default. UUID for MRP redundancy domain: 0x00000000-0000-0000-0000-000000000001 – 0xFFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFFFFE. By default, the UUID is 0xFFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFFFFF.

Example: The example below sets the redundancy domain:

```
>mrp domain new 1 main_domain 0x00000000-0000-0000-0000-000000000001
>mrp domain show 1
Domain:
  Admin Role:          Undefined
  Name:                main_domain
  UUID:               00000000-0000-0000-0000-000000000001
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:            0
>
```

Command: Delete Existing Redundancy Domain

Syntax: `mrp domain delete <domain>`

Description: Delete the existing redundancy domain, where:
 <domain>: Domain ID – Integer (1-2] of the redundancy domain to delete. The example below will delete the redundancy domain:

```
>mrp domain delete 1
>mrp domain show 1
Error: Domain not found
>
```

Messages:

Error: Domain not found

Invalid <domain> parameter: 0

Missing <domain> parameter

Command: **Modify Redundancy Domain**

Syntax: **mrp domain modify** <domain> <name> [<uuid>]

Description: Used to modify the name and UUID values in the redundancy domain, where:

<domain>: Domain ID – an integer (1-2) of the MRP domain to modify. The Domain UUID key attribute defines the redundancy domain representing the ring the MRP object belongs to. It is set to default Domain ID or provided as unique ID by engineering. UUID for MRP redundancy domain: 0x00000000-0000-0000-0000-000000000001 – 0xFFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFFFFE. By default, the UUID is 0xFFFFFFFF-FFFF-FFFF-FFFF-FFFFFFFFFFFFFFF.

<name> : Domain name – a string (up to 240 symbols) of the MRP domain to modify. The Domain Name attribute defines the redundancy domain representing the ring the Media redundancy object belongs to. It is set to default Domain Name or provided as unique ID by engineering.

<uuid> Domain UUID – a string in hexadecimal format xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx.

Example: The example below sets the redundancy domain:

```
>mrp domain show 1
Domain:
  Admin Role:          Undefined
  Name:                domain1
  UUID:                ffffffff-ffff-ffff-ffff-fffffffffffffff
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:             0
>mrp domain modify 1 MAIN-DOMAIN 00000000-0000-0000-0000-000000000001
>mrp domain show 1
Domain:
  Admin Role:          Undefined
  Name:                MAIN-DOMAIN
  UUID:                00000000-0000-0000-0000-000000000001
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:             0
>
```

Messages:

Error: unable modify domain with Id 1 and name ""

Invalid <domain> parameter: 0

Missing <domain> parameter

Command: **Configure MRP Domain Status**

Syntax: **mrp domain status <domain> [enable|disable]**

Description: Change (enable or disable) the specified MRP domain (service) status, where:
<domain>: The Domain ID – an integer (1-2).

enable : Accept domain

disable: Reject domain

Example 1:

```
>mrp domain status 1 enable
I tn_mrp 02:22:42 11/SetPortStateReq#365: Set port 4 to Blocked state
I tn_mrp 02:22:42 11/SetPortStateReq#376: Set port 5 to Blocked state
>mrp domain status 1 disable
>mrp domain show 1
Operational:
  Status:                Disabled
  Ring State:            Undefined
  Primary Ring Port State: Disabled
  Secondary Ring Port State: Disabled
Domain:
  Admin Role:            Manager
  Name:                  domain1
  UUID:                  ffffffff-ffff-ffff-ffff-fffffffffffffff
  Primary Ring Port ID:  4
  Secondary Ring Port ID: 5
  VLAN ID:               0
Manager:
  Priority:               0
  Topology Change Interval, ms: 20
  Topology Change Repeat Count, ms: 3
  Short Test Interval, ms: 30
  Default Test Interval, ms: 50
  Test Monitoring Count: 5
  Test Monitoring Extended Count: 15
  Non-blocking MRC supported: Enabled
  React On Link Change:  Enabled
  Check Media Redundancy Event: Enabled
>
```

The example below will start the MRP service and show the MRP service status:

Example 2:

```
>mrp domain status 1 enable
>mrp domain status 1
>Domain 1 is enabled
```

Messages:

Error: unable modify domain with Id 1, Invalid ring port

Error: unable modify domain with Id 1, Role is undefined

I tn_mrp 02:22:42 11/SetPortStateReq#365: Set port 4 to Blocked state

I tn_mrp 02:22:42 11/SetPortStateReq#376: Set port 5 to Blocked state

Command: Add Ring Port**Syntax:** **mrp domain ringport add** <domain> primary|secondary [<port>]**Description:** Add a new ring port to the MRP domain, where:

<domain>: Domain ID of the new ring port to be added to the MRP domain. Domain index – an integer (1-2).

<port> : Port number of the new ring port to be added to the MRP domain. This parameter specifies one port of a switch which is assigned as Ring Port 1 (primary) or Ring Port 2 (secondary) in the redundancy domain referenced by the value of the parameter Domain ID.

Example 1:

```
>mrp domain ringport add 1 primary 4
>mrp domain show 1
Domain:
  Admin Role:          Undefined
  Name:                domain1
  UUID:                ffffffff-ffff-ffff-ffff-fffffffffffffff
  Primary Ring Port ID: 4
  Secondary Ring Port ID: Undefined
  VLAN ID:            0
>mrp domain ringport add 1 secondary 5
>mrp domain show 1
Domain:
  Admin Role:          Undefined
  Name:                domain1
  UUID:                ffffffff-ffff-ffff-ffff-fffffffffffffff
  Primary Ring Port ID: 4
  Secondary Ring Port ID: 5
  VLAN ID:            0
>
```

The example below sets the Ring Port ID and show its status:

Example 1:

```
>mrp domain ringport add 1 primary 1
>mrp domain ringport show 1
Primary Ring Port ID: 1
Status:              Unknown
Secondary Ring Port ID: Undefined
>
```

Command: Delete Ringport**Syntax:** **mrp domain ringport delete** <domain> primary|secondary**Description:** Delete an existing Ring Port from the MRP domain, where:

<domain>: Domain ID of the MRP domain to be deleted (primary or secondary). Enter a Domain index – an integer (1-2).

The example below will delete Ring Port ID 1:

Example 1:

```
>mrp domain ringport delete 1 primary
>
```

Example 2:

```
>mrp domain ringport delete 1 secondary
Error: unable delete ring port
>
```

Messages:*Error: unable delete ring port**Invalid <domain> parameter: 0**Missing primary/secondary parameter*

Command: Show MRP Domain

Syntax: **mrp domain show** <domain>

Description: Display the existing MRP domain.

Example 1: >**mrp domain show 1**

```
Domain:
  Admin Role:      Undefined
  Name:           MAIN-DOMAIN
  UUID:          00000000-0000-0000-0000-000000000001
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:       0
>
```

Example 2: >**mrp domain show 1**

```
Domain:
  Admin Role:      Undefined
  Name:           domain1
  UUID:          ffffffff-ffff-ffff-ffff-fffffffffffffff
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:       0
>
```

Messages:

Error: Domain not found (the MRP domain does not yet exist).

Invalid <domain> parameter: 0 (the entry made is not supported - enter a valid parameter).

Missing <domain> parameter (the domain parameter was not entered).

Command: **Display Ring Port**

Syntax: **mrp domain ringport show** <domain> [primary|secondary]

Description: Display the ring port state, where:

<domain>: Domain ID with the port to be displayed. Enter a Domain index – an integer (1-2).
The example below will show the ring port state:

Example 1: >**mrp domain ringport show 1 primary**

```
Primary port: 1
Status      : Blocked
>
```

Example 2: >**mrp domain ringport show 1**

```
Primary Ring Port ID:      Undefined
Secondary Ring Port ID:   Undefined
>
```

Messages:

Invalid <domain> parameter: 0

Missing <domain> parameter

Command: **Set MRP Role**

Syntax: **mrp domain role set** <domain> <manager|client>

Description: Sets the role of the MRP object in the redundancy domain, where:

<domain>: The existing Domain ID with the role to be set. Enter a Domain index – an integer (1-2).
This attribute specifies the role of the MRP object in the redundancy domain.

manager | client : The Role to set in the specified domain (either “manager” or “client” role).
By default, the role is a ‘client’.

Example 1:

>**mrp domain show 1**

Operational:

```
Role:                Undefined
Status:              Disabled
Ring State:          Undefined
Primary Ring Port State: Unknown
Secondary Ring Port State: Unknown
```

Domain:

```
Admin Role:          Manager
Name:                Domain1
UUID:                Default
Primary Ring Port ID: 8
Secondary Ring Port ID: 1
VLAN ID:             2
```

Manager:

```
Priority:             8
Topology Change Interval, ms: 10
Topology Change Repeat Count: 3
Short Test Interval, ms: 10
Default Test Interval, ms: 20
Test Monitoring Count: 3
Test Monitoring Extended Count: 15
Non-blocking MRC supported: Disabled
React On Link Change: Disabled
Check Media Redundancy Event: Enabled
```

>

Example 2:

```

>mrp domain role set 1 manager
>mrp domain show 1
>mrp domain show 1
  Role:                               Undefined
  Status:                              Disabled
  Ring State:                           Undefined
  Primary Ring Port State:              Unknown
  Secondary Ring Port State:            Unknown
Domain:
  Admin Role:                           Manager
  Name:                                  main_domain
  UUID:                                  00000000-0000-0000-0000-000000000001
  Primary Ring Port ID:                  Undefined
  Secondary Ring Port ID:                Undefined
  VLAN ID:                               0
Manager:
  Priority:                               8
  Topology Change Interval, ms:          10
  Topology Change Repeat Count:          3
  Short Test Interval, ms:               10
  Default Test Interval, ms:             20
  Test Monitoring Count:                  3
  Test Monitoring Extended Count:         15
  Non-blocking MRC supported:             Disabled
  React On Link Change:                   Disabled
  Check Media Redundancy Event:           Enabled
>

```

Command: **Configure VLAN ID***Syntax:* **mrp domain vlan set <domain> <vlanid>***Description:* Configures the VLAN identifier in the redundancy domain (the VLAN ID assigned to the MRP protocol). The parameters are:**<domain>** : The existing Domain ID with the VID to be set. Enter a Domain ID (1-2).**<vlanid>** : VLAN number – an integer (2-4095). This optional attribute may be used by the MRP object and specifies its VLAN identifier in the redundancy domain. The default value is 0. Note that VLAN ID 1 is reserved for the Management VLAN.*Example:* The example below sets the VLAN ID:

```

>mrp domain vlan set 2 100
>

```

Messages: *Error: unable modify domain with Id 1, VLAN ID is used for management*

Command: **Display MRP State**

Syntax: **mrp domain show <domain>**

Description: Displays the current MRP state in terms of its Operational, Domain, and Manager status, where:
<domain> : The Domain ID - enter an integer (1-2).

Example 1: The example below displays the MRP engine status with the domain configured as 'Manager'.

```
>mrp domain show 1
Operational:
  Role:                Undefined
  Status:              Disabled
  Ring State:         Undefined
  Primary Ring Port State: Unknown
  Secondary Ring Port State: Unknown
Domain:
  Admin Role:         Manager
  Name:              Domain1
  UUID:              Default
  Primary Ring Port ID: 8
  Secondary Ring Port ID: 1
  VLAN ID:           2
Manager:
  Priority:            8
  Topology Change Interval, ms: 10
  Topology Change Repeat Count: 3
  Short Test Interval, ms: 10
  Default Test Interval, ms: 20
  Test Monitoring Count: 3
  Test Monitoring Extended Count: 15
  Non-blocking MRC supported: Disabled
  React On Link Change: Disabled
  Check Media Redundancy Event: Enabled
>
```

Example 2: The example below displays the MRP engine status with the domain configured as 'Client'.

```
>mrp domain show 1
Operational:
  Role:                Undefined
  Status:              Disabled
  Ring State:         Undefined
  Primary Ring Port State: Unknown
  Secondary Ring Port State: Unknown
Domain:
  Admin Role:         Client
  Name:              MAIN-DOMAIN
  UUID:              00000000-0000-0000-0000-000000000001
  Primary Ring Port ID: Undefined
  Secondary Ring Port ID: Undefined
  VLAN ID:           2
Manager:
  Priority:            8
  Topology Change Interval, ms: 10
  Topology Change Repeat Count: 3
  Short Test Interval, ms: 10
  Default Test Interval, ms: 20
  Test Monitoring Count: 3
  Test Monitoring Extended Count: 15
  Non-blocking MRC supported: Disabled
  React On Link Change: Disabled
  Check Media Redundancy Event: Enabled
>
```

Messages: **Error: Domain not found**

Command: Display MRP Events and Diagnostic Status

Syntax: `mrp domain diag show <domain>`

Description: Displays MRP events and the diagnostic status, where:
<domain> Domain ID – an integer (1-2).

Example 1: The example below displays the diagnostic status of MRP engine if the domain is configured as a manager.

```
>mrp domain diag show 1
Ring Open Count           :           0
Last Ring Open Change     : 1970-01-01T00:00:00+00:00
Tx Total                   :           0
Rx Total                   :           0
Rx Error Total             :           0
Rx Unrecognized           :           0
Round Trip Delay Min, ms  :           0
Round Trip Delay Max, ms  :           0
>
```

Command: Clear MRP Events

Syntax: `mrp domain diag clear <domain>`

Description: Clears an MRP events and statistics. All statistics values are reset to 0. The parameters are:
<domain> : Domain ID – an integer (1-2).

Example: `>mrp domain diag clear 1`
`>`

Note: use the “`mrp domain diag show`” command above to verify the diagnostic status.

MRP Manager Commands

Command: Configure Priority

Syntax: `mrp manager priority set <domain> <priority>`

Description: Changes the priority of the MRM, where:

<domain> : Domain ID – an integer (1-2).

<priority> : Priority – an integer (0-16). A lower value indicates a higher priority, 0 (highest priority) to 16 (lowest priority) in increments of 1. The default priority is 8.

Example: The example below sets the MRM priority of Domain 1 to a priority of 0:

```
>mrp manager priority set 1 0
>
```

Command: Configure Topology Change Interval and Repeat Count

Syntax: `mrp manager topologychange set <domain> <interval> [<count>]`

Description: Changes the topology change interval and the topology change repeat count, where:

<domain> : Domain ID – enter an integer (1-2).

<interval> : Topology change interval – an integer 1-20, in ms (milliseconds). This parameter specifies the interval for sending *MRP_TopologyChange* frames and the interval count which controls repeated transmissions of *MRP_TopologyChange* frames. The granularity of the interval for sending *MRP_TopologyChange* frames is 1ms. The default topology change interval value is 10 ms (milliseconds).

<count> : Topology change repeat count – enter an integer (1-5). The default value is 3.

Example: The example below sets the topology change interval for Domain 1 with an interval of 20 ms and a topology change count of 20:

```
>mrp manager topologychange set 1 20 5
>
```

Command: Configure Short Test Interval and Default Test Interval

Syntax: `mrp manager test interval set <domain> <default> [<short>]`

Description: Changes the short test and default interval, where:

<domain> : Domain ID – enter an integer (1-2).

<default> : Default test interval – an integer (1-50) in ms. The default value is 20 ms.

These parameters specify the short interval for sending *MRP_Test* frames on ring ports after link changes in the ring and the default interval for sending *MRP_Test* frames on ring ports.

The granularity of the interval for sending *MRP_Test* frames is 1ms.

<short> : Short test interval – enter an integer (1-30) in ms. The default value is 20 ms.

Example: The example below sets the short test interval of Domain ID 1:

```
>mrp manager test interval set 1 10 10
>
```

Command: Configure Test Monitoring Count

Syntax: `mrp manager test monitoring set <domain> <count> [<extcount>]`

Description: Changes the test monitoring count and the test monitoring extended count values where:

<domain> : Domain ID – enter an integer (1-2).

<count> : Test monitoring count – an integer (1-5). The default is 3.

<extcount> : Test extended monitoring count – an integer (1-15). The default is 5.

These parameters specify the interval count for monitoring the reception of *MRP_Test* Frames and the extended interval count for monitoring the reception of *MRP_Test* frames.

Example: The example below sets the test monitoring count: for Domain 1:

```
>mrp manager test monitoring set 1 3 15
>
```

Command: Configure Non-blocking MRC Supported**Syntax:** `mrp manager nonblocking supported set <domain> enable|disable`**Description:** Changes the ability of the MRM to support MRCs without BLOCKED port state support in the ring, where:**<domain>** : Domain ID – enter an integer (1-2).**enable|disable** : This attribute specifies the ability of the MRM to support MRCs without BLOCKED port state support in the ring. By default, the Non-blocking MRC supported is disabled.**enable** : Accept the specified domain.**disable**: Reject the specified domain.**Example:** The example below sets the Non-blocking MRC support to enabled:

```
>mrp manager nonblocking supported set 1 enable
>
```

Command: Configure React on Link Change**Syntax:** `mrp manager linkchangereact set <domain> enable|disable`**Description:** Changes the ability of the MRM to react on link change, where:**<domain>** : Domain ID – enter an integer (1-2).**enable|disable** : This optional attribute specifies whether the MRM reacts on MRP_LinkChange frames. By default, the react on link change is disabled.**enable** : Accept the specified domain.**disable**: Reject the specified domain.**Example:** The example below sets the value of react on link change to enabled:

```
>mrp manager linkchangereact set 1 enable
>
```

Command: Configure Check Media Redundancy Monitoring**Syntax:** `mrp manager monitor set <domain> enable|disable`**Description:** Changes the ability to monitor the MRM state in the redundancy domain, where:**<domain>** : Domain ID – enter an integer (1-2).**enable|disable** : Specifies whether monitoring of MRM state is enabled or disabled in the redundancy domain. The default is disabled.**enable** : Accept the specified domain.**disable**: Reject the specified domain.**Example:** The example below sets the check media redundancy to enabled:

```
>mrp manager monitor set 1 enable
>
```

MRP Client Commands

Command: Configure Link Up Interval, Link Down Interval and Link Change Count

Syntax: `mrp client link interval set <domain> <down> [<up>] [<count>]`

Description: Changes the value of the link up interval, the link down interval, and the link change count, where:

<domain> : Domain ID – an integer (1-2).

<up> : Link up interval – an integer (1-50) in ms. specifies the interval for sending *MRP_LinkUp* frames on ring ports. The granularity of the interval for sending *MRP_LinkUp* frames is 1ms. The default link up interval value is 20ms.

<down> : Link down interval – an integer (1-50) in ms. Specifies the interval for sending *MRP_LinkDown* frames on ring ports. The granularity of the interval for sending *MRP_LinkDown* frames is 1ms. The default link down interval value is 20ms.

<count>: Link change count – an integer (1-10). Specifies the *MRP_LinkChange* frame count which controls repeated transmission of *MRP_LinkChange* frames. The default link change count is 4.

Example: The example below sets the link up interval to 10 ms and the link down interval to 5 for Domain ID 1:

```
>mrp client link interval set 1 10 5
>
```

Command: Configure Blocked State Supported

Syntax: `mrp client blockedstate set <domain> enable|disable`

Description: Changes the MRC supports the blocked state at ring ports, where:

<domain> : Domain ID – an integer (1-2).

enable|disable : Specifies whether the MRC supports BLOCKED state at its ring ports. By default, the value is enabled.

Example: The example below sets the blocked state supported:

```
>mrp client blockedstate set 1 enable
>
```

4. Web Interface

The Indura MRP module can be configured and monitored from the Web GUI.

The **Configuration > MRP** menu path lets you add, define, and edit the Domain Profiles and parameters.

The **Monitor > MRP** menu path lets you monitor a Domain Profile, Domain Events, and Domain Statistics.

Configuration > MRP

Domain Profile Settings

This page lets you create, delete, or edit MRP domain profiles. The attributes defined here are described in “[MRP Ring Configuration Parameters](#)” on page 11. At the default page, click the **Add New Domain** button to configure the MRP instance:

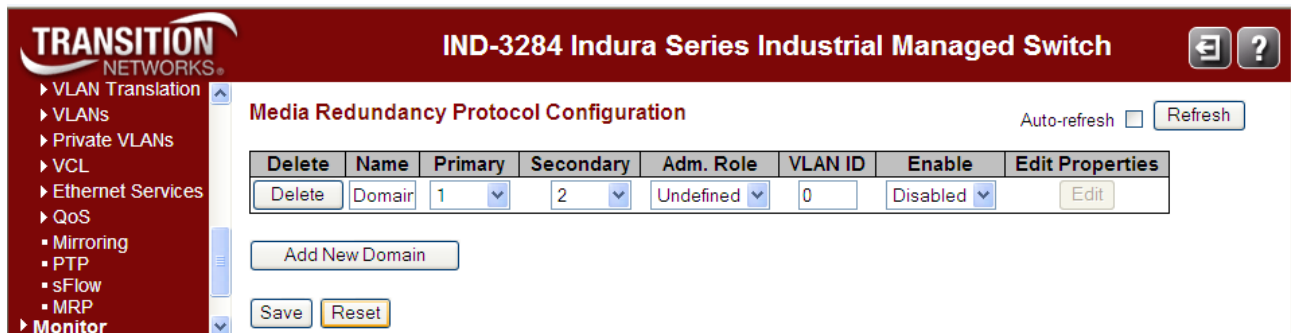


Figure 5. MRP Configuration Page

The parameters are explained below.

Delete: To delete an existing profile, check a checkbox on the profile entry and click the “**Save**” button.

Name: The Domain Name –a unique logical name for the MRP domain to help manage MRP domains.

Primary: The first ring port (the port which first comes to the Link UP state). This is the index of the layer 2 interface which is used as ring port **1**. Select 1-12 at the dropdown.

Secondary: The second ring port. This is the index of the layer 2 interface which is used as ring port **2**. Select 1-12 at the dropdown.

Admin Role: One of three available role options:

Undefined: sets the entity to a role of neither MRM nor MRC. This role can not be edited.

Client: sets the entity to the role of a Media Redundancy Client, MRC.

Manager: sets the entity to the role of Media Redundancy Manager, MRM.

VLAN ID: An optional attribute that may be used by the MRP object to specifies its VLAN identifier in the redundancy domain. The VLAN ID assigned to the MRP protocol. The valid range is 2 - 4094.

Enable: Select to enable or disable this MRP profile. You must set the **Enable** dropdown to **Disabled** before you can edit and save an enabled MRP instance. The message “*Domain is enabled.*” displays if you try this.

Edit Properties: Press the “**Edit**” button to edit all properties of an existing domain depending on a selected role.

All devices in a ring which are configured with MRP must be part of the same redundancy domain. Domains are identified by *Domain* or *DomainName*.

Buttons

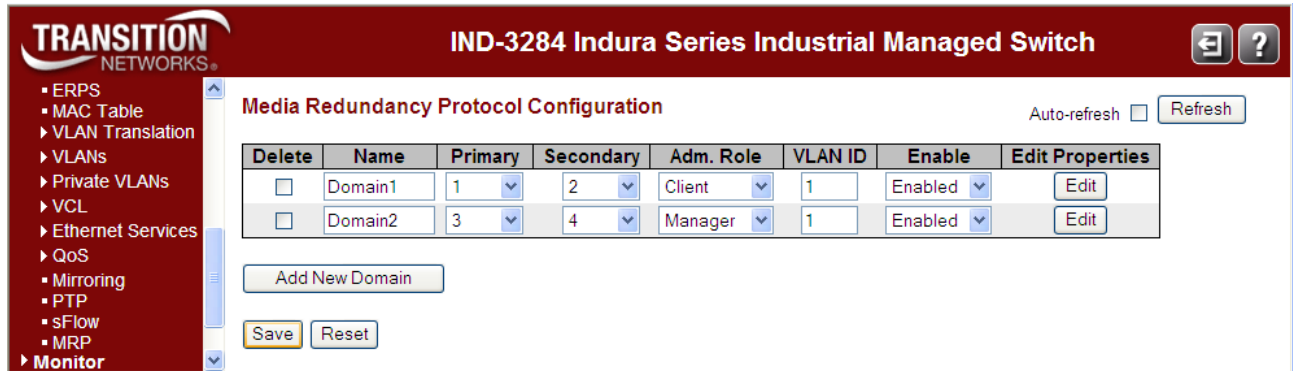
Add New Domain: Add new entry to appropriate table. Click to add a new domain row. The maximum number of instances is two.

Edit: Edit additional properties of an existing domain. You must set the **Enable** dropdown to **Disabled** before you can edit an enabled MRP instance. The message “*Domain is enabled.*” displays if you try this.

Save: Click to save changes.

Reset: Click to undo any changes made locally and revert to previously saved values.

The example below shows a Client Admin. Role (Domain1) and a Manager Admin. Role.



The domain named **Domain1** is enabled and set to the **Adm. Role** of **Client** with VLAN **1** assigned in the example.

The domain named **Domain2** is enabled and set to the **Adm. Role** of **Manager** with VLAN **1** assigned in the example.

You can now click the **Edit** button to configure the Ring Domain. The specific parameters displayed depend on whether the **Adm. Role** is set to **Manager** or **Client** (see below).

Ring Domain Configuration (Manager Role)

This page lets you edit MRP Ring Domain profile settings for the Manager role.

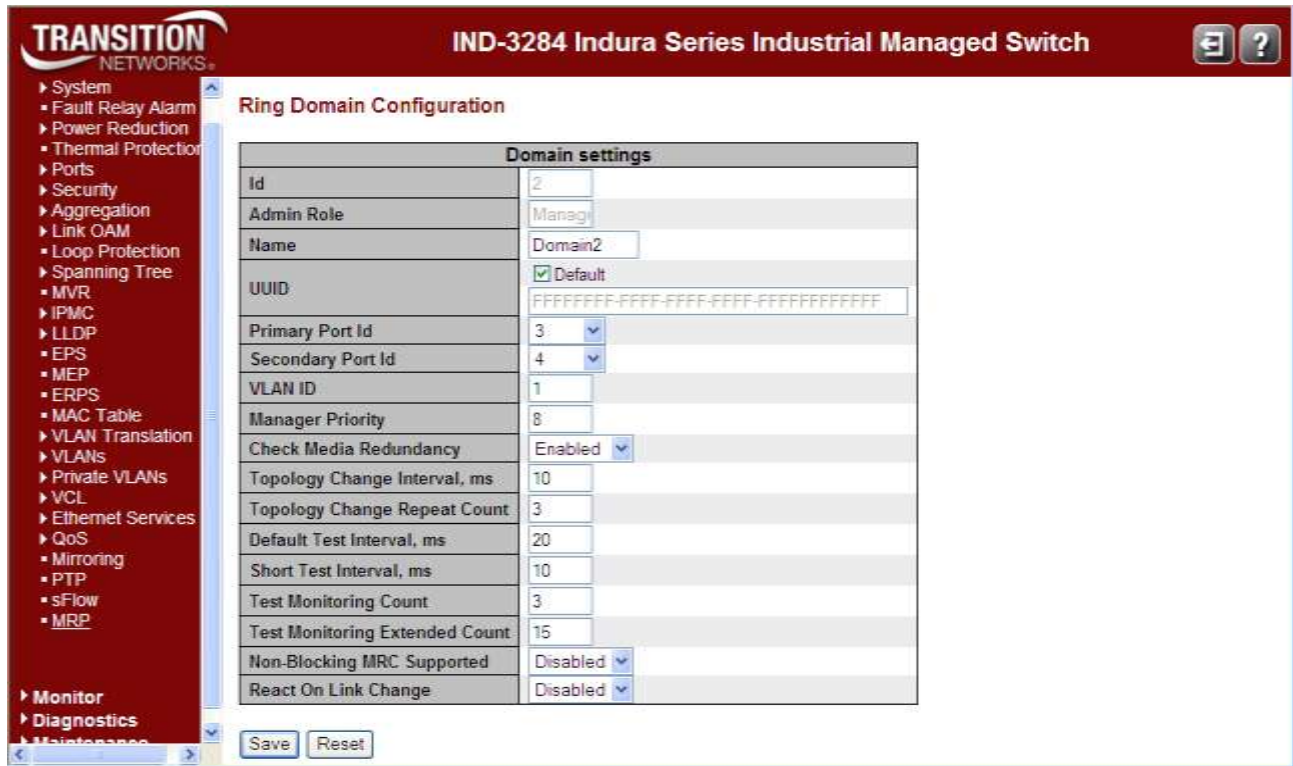


Figure 6. Ring Domain Configuration for Manager Role

The Ring Domain Properties for the Manager role are explained below.

ID: The index of the entry (e.g., 2 above).

Admin Role: Displays “Manager” if the value is set to the role of a Media Redundancy Manager (MRM) at the MRP Protocol Configuration page.

Name: A logical name for the MRP domain to simplify management of MRP domains (e.g., *Domain2* above).

UUID: Universally unique identifier belonging to the MRP domain which represents a ring. Check or uncheck the **Default** checkbox.

Primary Port Id: The index of the layer 2 interface which is used as ring port 1 (1-12 or None).

Secondary Port Id: The index of the layer 2 interface which is used as ring port 2. Select a different ID than the “Primary Port Id” (1-12 or None).

VLAN ID: The VLAN ID assigned to the MRP protocol. The valid range is 0 to 4094.

Manager Priority: This parameter contains the value for the manager priority. (0-15).

Check Media Redundancy: This parameter selects whether monitoring of MRM state is enabled or disabled. (Only MRM.)

Topology Change Interval, ms: This parameter contains the value of the interval for sending *MRP_TopologyChange* frames. The valid range is 1 to 20. (Only MRM.)

Topology Change Repeat Count: The interval count which controls repeated transmissions of *MRP_TopologyChange* frames. The valid range is 1 to 5. (Only MRM.)

Short Test Interval, ms: The value of the short interval for sending *MRP_Test* frames on ring ports after link changes in the ring. The valid range is 1 to 30. (Only MRM.)

Default Test Interval, ms: The default interval for sending *MRP_Test* frames on ring ports. The valid range is 1 to 50. (Only MRM.)

Test Monitoring Count: The interval count for monitoring the reception of *MRP_Test* frames. The valid range is 1 to 15. (Only MRM.)

Test Monitoring Extended Count: This optional parameter contains the value of the extended interval count for monitoring the reception of *MRP_Test* frames. The valid range is 1 to 30. (Only MRM.)

Non-blocking MRC supported: Specifies the ability of the MRM to support MRCs without *BLOCKED* port state support in the ring. (Only MRM.)
Select Enable or Disable.

React On Link Change: This optional parameter specifies whether the MRM reacts on *MRP_LinkChange* frames or not. Select Enable or Disable. (Only MRM.)

Buttons

Save: Click to save changes.

Reset: Click to undo any changes made locally and revert to previously saved values.

Ring Domain Configuration (Client Role)

This page lets you edit MRP domain profile settings for the Client role.

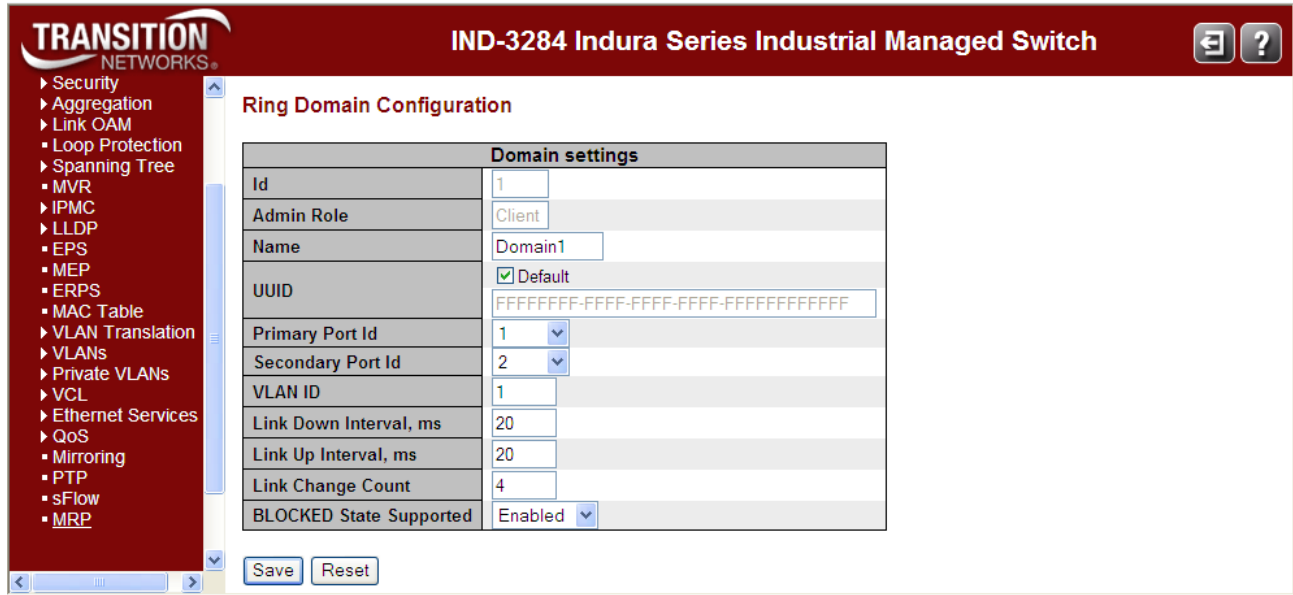


Figure 7. Ring Domain Configuration for Client Admin Role

The Ring Domain Properties for the Client role are explained below.

Id: The index of the entry.

Admin Role: Displays the role of “Client”, if the value is set to the role of Media Redundancy Client (MRC). at the MRP Protocol Configuration page.

Name: A logical name for the MRP domain to simplify management of MRP domains (e.g., *Domain1*).

UUID: Universally Unique Identifier belonging to the MRP domain which represents a ring. Check or uncheck the **Default** checkbox.

Primary Port Id: The index of the layer 2 interface which is used as ring port 1.

Secondary Port Id: The index of the layer 2 interface which is used as ring port 2.

VLAN ID: The VLAN ID assigned to the MRP protocol. The valid range is 0 to 4094.

Link Down Interval, ms: The interval for sending *MRP_LinkDown* frames on ring ports. The valid range is 1 to 50. The default is 20 ms.

Link Up Interval, ms: The interval for sending *MRP_LinkUp* frames on ring ports. The valid range is 1 to 50. The default is 20 ms.

Link Change Count: The *MRP_LinkChange* frame count which controls repeated transmissions of *MRP_LinkUp* or *MRP_LinkDown* frames. The valid range is 1 to 10.

BLOCKED State Supported: Specifies whether the MRC supports *BLOCKED* state at its ring port. Select *Enabled* or *Disabled*. The default is Enabled.

Buttons

Save: Save changes.

Reset: Undo any changes made locally and revert to previously saved values.

Monitor > MRP

This page shows the current state of a domain profile, events, and statistics from the **Monitor > MRP** menu path.

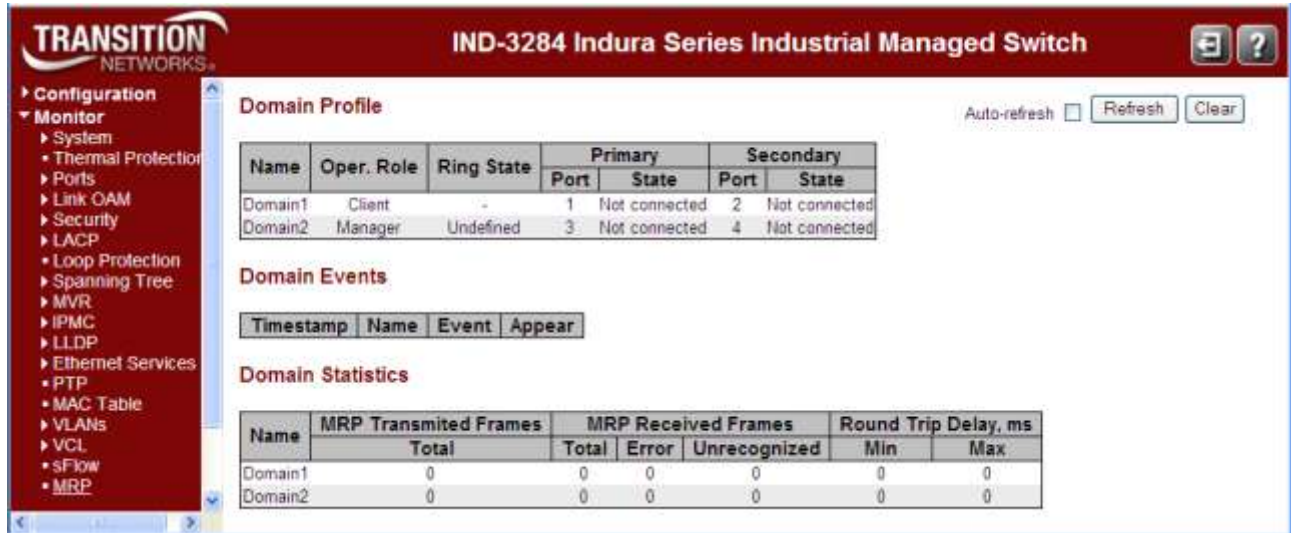


Figure 8. MRP Monitoring Web Page

The **Monitor > MRP** page parameters are explained below.

Domain Profile

Name: The assigned logical name for the MRP domain (e.g., *Domain 1*).

Oper. Role: The operational role of an MRP entity per domain (e.g., *Manager* or *Client* or *Undefined*).

Ring State: The current Ring status of the MRP entity (e.g., *Closed* or *Undefined*).

Primary Port: The port number of the primary ring port (e.g., *Port 2*). The *ifIndex* of the layer 2 interface which is used as ring port 1.

Primary State: The current ring port state (e.g., *Forwarding* or *Unknown*).

Secondary Port: The port number of the secondary ring port (e.g., *Port 2*). The *ifIndex* of the layer 2 interface which is used as ring port 2.

Secondary State: The current ring port state (e.g., *Blocked* or *Unknown*).

Domain Events

The Domain Events table stores ten event records. The parameters are:

Timestamp: The date and time of the domain event. This is the value of *sysUpTime* at the time of the logged event.

Name: The assigned logical name for the MRP domain (e.g., *Domain 1*).

Event: the event type (e.g., *Ring Open*, *Multiple Managers*).

Appear: Event *appear* or *disappear* flag; displays *True* if Event appear or *False* if Event disappear.

Domain Statistics

Name: The assigned logical name for the MRP domain (e.g., *Domain 1*).

MRP Frames Transmitted Total: The total number of transmitted frames.

MRP Received Frames (Total): The total number of received frames.

MRP Received Frames (Error): The number of errored frames received.

MRP Received Frames (Unrecognized): The number of unrecognized frames received.

Round Trip Delay, ms (Min): The minimum Round-Trip-Delay (in milliseconds) which was measured since startup.

Round Trip Delay, ms (Max): The maximum Round-Trip-Delay (in milliseconds) which was measured since startup.

Buttons

Auto-refresh: Automatically updates this page every three seconds when checkbox is checked.

Refresh: Click to refresh this page immediately.

Clear: Clear all events and statistics in all domains.

5. Messages and Troubleshooting

MRP Events in System Log

Diagnostic events are stored in the system log messages and can be shown via the CLI or web GUI. All diagnostic events are stored with a timestamp. Only the last 10 events are stored in the MRP module.

In a redundancy domain, the following diagnostic event handling is implemented by each MRM.

- If a device is configured as MRM, but not operating in the Manager role, it will signal a “*MANAGER_ROLE_FAIL*” diagnosis event and suspend reporting of all other media redundancy diagnosis events while not in the Manager role.
- If a device is operating in manager role and this device detects another active MRM, it will signal the “*MULTIPLE_MANAGERS*” event. This event can occur concurrently with the ring state event “*RING_OPEN*”.
- If a device is operating in the Manager role and detects an open ring, it will signal the “*RING_OPEN*” event.

Diagnostic events can be cleared via the CLI or web GUI. All Events are cleared after reset of the device.

For More Information

Web GUI: See the **Monitor > System > Log** menu path for diagnostic events logging information in the *Indura User Guide* manual.

CLI: See the “**System Log**” commands in the *Indura User Guide* manual.

MRP Messages

This section provides general and specific MRP problem solving suggestions, general error recovery steps, and specific web interface messages, meanings, examples, and possible recovery steps. For functional level troubleshooting for Indura web interface operation, see the “Web Interface Messages” section of the Indura Web Interface User Guide, 33506. Topics there include troubleshooting EPS, ERPS, IPv6, etc.

Message: `TN_MRP_RC_OK = 0`
Meaning: Success. No error
Recovery: None required.

Message: `TN_MRP_RC_ERROR`
Meaning: A general MRP error was detected (the specified function failed or no entry was specified).
Recovery: Verify the function / parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: `TN_MRP_RC_INVALID_PARAMETER`
Meaning: An Invalid input parameter was received.
Recovery: 1. Verify the input parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: `TN_MRP_RC_DOMAIN_EXIST`
Meaning: The domain instance has already been created.
Recovery: 1. Modify the input parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: `TN_MRP_RC_DOMAIN_RUN`
Meaning: The domain with the requested ID is enabled.
Recovery: 1. Continue operation. 2. See the related section of this manual.

Message: `TN_MRP_RC_DOMAIN_ROLE_UNDEFINED`
Meaning: The Domain role is not defined.
Recovery: 1. Verify the input parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: `TN_MRP_RC_RINGPORT_IS_USED`
Meaning: At least the one ring port is used in other domain.
Recovery: 1. Verify the input parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: `TN_MRP_RC_INVALID_RINGPORT`
Meaning: The specified ringport is not available or does not exist.
Recovery: 1. Verify the input parameter. 2. Retry the operation. 3. See the related section of this manual.

Message:

- Creation failed, %s
- Disable failed, %s
- Enable failed, %s
- Invalid parameters on the form
- Modify failed, %s
- No entries

Meaning: The specified function failed or no entry was specified.

Recovery: 1. Verify the function / parameter. 2. Retry the operation. 3. See the related section of this manual.

Message: *W tn_mrp 00:38:07 61/tn_mrp_set_vlan_to_port#1878: Warning: MRP delete VLAN-1 failed in isid-1, VLAN parameter error*

Meaning: You tried to delete an MRP instance, but the associated VLAN can not be deleted.

Recovery: 1. Associate a different VLAN. 2. Retry the operation. 3. Continue operation.

Message: *This browser doesn't support dynamic tables.*

Meaning: The browser used is not supported or is misconfigured. For example, as of Windows Internet Explorer 8 (IE8), dynamic properties are deprecated.

Recovery:

1. Verify that the browser used is supported.
2. Check the browser's configuration.
3. Select a different web browser or upgrade the existing web browser version.

Message: *Ring port is used*



Meaning: You tried to save an invalid Media Redundancy Protocol Configuration.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Change the settings at the **Configuration > MRP** menu path.

Message: Domain is enabled

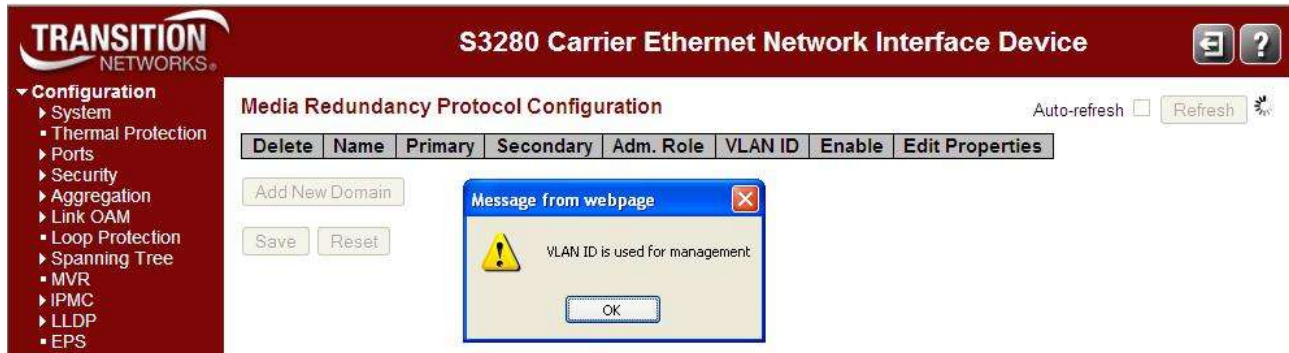


Meaning: You successfully edited an MRP domain, or you tried to delete an enabled MRP domain.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Disable the MRP domain instance, check the **Delete** checkbox, and then click the **Save** button at the **Configuration > MRP** menu path.

Message: VLAN ID is used for management



Meaning: You tried to assign VID 1 to the MRP VLAN ID, but VID 1 is reserved for the Management VLAN ID (VID).

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Select a VLAN ID other than 1.

Message: Invalid ring port

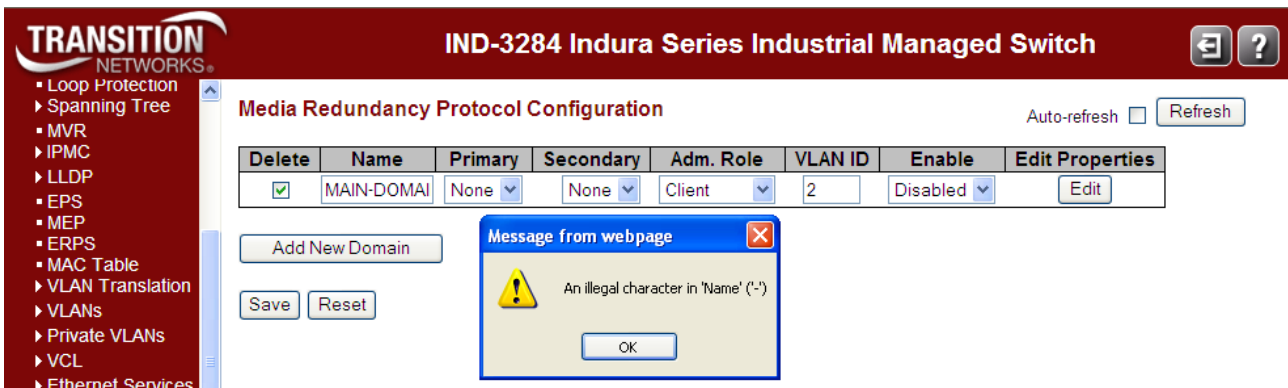


Meaning: You configured and tried to save an invalid MRP configuration

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Edit the "Ring Domain Configuration" table; set either the "Primary Port Id" field to **None** or set the "Secondary Port Id" to **None**, but not both.

Message: An illegal character in 'Name' ("-")



Meaning: At the **Configuration > MRP** menu path you entered an invalid character (e.g., the *dash* character) in the specified (e.g., 'Name') field.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Enter the 'Name' parameter without the illegal character.

Message: *The maximum number of entries is 2*



Meaning: At the **Configuration > MRP** menu path you tried to enter a third MRP instance, but only two instances can be configured.

Recovery:

1. Click the **OK** button to clear the webpage message.
2. Edit one of the existing two entries and continue operation.

For More Error Message Information

For specific messages resulting from Indura web interface operation, see the “Web Interface Messages” section of the Indura Web Interface User Guide, 33510.

For specific messages resulting from Indura CLI operation, see the “CLI Messages” section of the Indura CLI Reference Guide, 33508.

MRP Troubleshooting

1. Ensure that the Indura was installed properly. See the Indura install guide manual.
2. Verify that the prerequisites for MRP operation are met. See "[Prerequisites and Restrictions](#)" on page 6.
3. Verify that the maximum number of nodes at the ring is limited to 50 devices.
4. Verify that the ring is set up with all MRP-capable components.
5. Make sure that all devices are connected via their ring ports.
6. Make sure that MRP is activated for all devices.
7. Verify the ring ports' settings (e.g., Full duplex, 100 Mbps).
8. Make sure that all devices within a ring are part of a redundancy domain.
9. Note that a ring node must be declared as redundancy Manager if the nodes do not negotiate with the Manager themselves. All others nodes become redundancy Clients.
10. Make sure that the Indura STP function is disabled both globally and at the port level. This is done at the **Configuration > Spanning Tree > CIST Ports** menu path or via the "**stp**" commands. MRP is not compatible with Spanning Tree Protocol (STP) and Rapid Spanning Tree Protocols (RSTP).
STP (Spanning Tree Protocols) is enabled by default on the Indura. When enabled, the Indura periodically sends Spanning Tree packets on all ports. The Spanning Tree packets take from the available bandwidth that is needed to pass the test.
11. Make sure that the maximum number of MRP instances is two or one.

6. SNMP MIBs

This section discusses the Management Information Bases (MIBs) provided for configuring MRP nodes.

SNMP MIBs for Configuring MRP Nodes

There are two Management Information Bases (MIBs) for configuring MRP nodes:

- a MIB with a Management and Monitoring view. (see below)
- a proprietary MIB with a Monitoring view see page 48.

MRP MIB with a Management and Monitoring View

IEC-62439-2-MIB

UuidType: The IEC 61158-5-10 defines the structure of the UUID as a data type numeric identifier 1025.

Root OID

iec62439 ORGANIZATION "IEC/SC 65C"

This MIB module defines the Network Management interfaces for the three Redundancy Protocols defined by the IEC standard 62439. This definitions specifies the monitoring and management variant of a SNMP entity. If the SNMP entity only contains monitoring functionality, then IEC 62439 monitoring MIB definitions will be used instead of this MIB module. An entity may support either the monitoring facet only or the management facet including the monitoring facet as a subset.

Redundancy Protocols:

mrp = iec62439 1
 prp = iec62439 2
 crp = iec62439 3
 brp = iec62439 4

objects groups of redundancy object identifiers:

mrpObjects = mrp 1
 mrpNotifications = mrp 2
 mrpConformance = mrp 3

Objects of the MRP Network Management

mrpDomainTable: Every entry in this table contains information about a Media Redundancy Protocol (MRP) domain. Row entries can be created or deleted via SNMP operations. Therefore the MAX-ACCESS values of some Object Identifier are different from the values of the same Object Identifier in the pure monitoring facet.

mrpDomainIndex: The index of the entry.

mrpDomainID: (IEC62439UuidType) Universally unique identifier belongs to the MRP domain which represents a ring.

mrpDomainName: A logical name for the MRP domain to ease the management of MRP domains.

AdminRole: Controls the MRP behavior of the system per domain, where:

client(1) the entity will be set to the role of a Media Redundancy Client (MRC).

manager(2) the entity will be set to the role of a Media Redundancy Manager (MRM).

The factory settings are recommended to adjust the value of this object to the client(1) capability of the component in order to prevent multiple managers are in ring (the order of the capabilities do not necessarily conform to the order of the object values here).

If the agent restricts the write access, no matter what reason, it will reject write requests by responding with 'badValue'.

OperRole: The operational role of an MRP entity per domain.

disabled(0) signals that the entity doesn't work (whatever reason).

client(1) signals that the entity is in a client role.

manager(2) signals that the entity is the manager of this MRP domain.

mrpDomainRingPort1: The ifIndex of the layer 2 interface which is used as ring port 1.

mrpDomainRingPort1State: The operational state of the first Ring-Port, where:

disabled(1): indicates that all frames are dropped.

blocked(2): indicates that all frames are dropped except:

- MRP topology change frames and MRP test frames from a MRM,
- MRP link change frames from an MRC,
- frames from other protocols that also define to pass blocked(2) ports.

forwarding(3): indicates that all frames are passed through according to the forwarding behavior of IEEE 802.1D.

not-connected(4): indicates that the port has no link.

mrpDomainRingPort2: The ifIndex of the layer 2 interface which is used as ring port.

mrpDomainRingPort2State: The operational state of the second Ring-Port, where:

disabled(1): indicates that all frames are dropped.

blocked(2): indicates that all frames are dropped except :

- MRP topology change frames and MRP test frames from a MRM,
- MRP link change frames from an MRC,
- frames from other protocols that also define to pass blocked(2) ports.

forwarding(3): indicates that all frames are passed through per the forwarding behavior of IEEE 802.1D.

not-connected(4) indicates that the port has no link.

mrpDomainState: The operational status of the MRP entity, where:

disabled(0): MRP switched off. All higher bits are invalid and will be reset.

undefined(1): Value is not valid. All higher bits are invalid and will be reset.

ringOpen(2): MRP ring redundancy lost. All higher bits are invalid and will be reset.

reserved(3): reserved for further extensions.

mrpDomainError: If the device couldn't switch to the desired administrative state (thus the value of "mrpDomainState" is not the expected one), this value provides the reason. Otherwise the bit noError(0) is set.

All higher bits are invalid and will be reset.

invalidVlanId(1): the assigned VLAN ID is not permitted .

invalid (2): Value is not valid. All higher bits are invalid and will be reset.

multipleMRM(3): multiple active managers in ring domain.

singleSideReceive(4): the test frames of an MRM have been seen, but only on one port.

mrpDomainBlocked: The entity supports blocked ring ports. Shows whether a MRP domain requires the support of the BLOCKED port state at ring ports. The manager of an MRP domain decides whether this support is required. If set to **enabled** the manager demands that all clients will support the blocked attribute also set to enabled.

If set to **disabled** at the manager, then the value of mrpDomainBlocked can be arbitrary at the clients.

enabled(1) client: supports ring ports whose port state can be blocked.

manager: works only with clients supporting blocked ring ports.

disabled(2) client: no support of blocked ring ports.

manager: Work with clients supporting blocked ring ports and with clients not supporting blocked ring ports.

mrpDomainVlanId: The VLAN ID assigned to the MRP protocol. The VLAN ID only is in use when the bit invalidVlanId is not set in mrpDomainError. If value is set to 0, then no VLAN is assigned. The invalidVlanId will be set to 0 (no Error).

Objects of the MRP Network Management for Manager Role

mrpDomainManagerPriority: The priority of this MRP entity. If the device is client only, the value of this object will be ignored by the MRP entity. Only the four most significant bits are used; bits 0 to 11 are reserved.

The smaller value has the higher priority.

mrpDomainRingOpenCount: Counter for ring-state changes to open.

mrpDomainLastRingOpenChange: Timeticks since last change of ring-state to ring open.

mrpDomainRoundTripDelayMax: The max. Round-Trip-Delay (in **milliseconds**) which was measured since startup. UNITS: " **milliseconds** "

mrpDomainRoundTripDelayMin: The min. Round-Trip-Delay (in **milliseconds**) which was measured since startup. UNITS: " **milliseconds** "

mrpDomainResetRoundTripDelays: A write request with resetDelays(1) will reset the values of mrpDomainRoundTripDelayMax and mrpDomainRoundTripDelayMin to zero at the same time.

mrpDomainMRMReactOnLinkChange: Tells whether or not the MRM reacts on all MRP link change frames.

enabled(1): indicates that the MRM reacts on all MRP link change frames.

disabled(2): indicates that the MRM does not react on link down MRP link change frames.

Additional Objects of the MRP Network Management for management

mrpDomainRowStatus: Support of creation and deletion of rows. A row can be taken out of service by writing the value notInService(2).

Conformance statements

mrpRedundancyGroups { mrpConformance 1 }

mrpDomainBasicGroup: Parameters which are necessary to monitor and control the status of MRP domains.

mrpDomainManagerGroup: Parameters which are additional to monitor and control the status of MRP domain managers.

mrpDomainBlockingCntrlGroup: Parameters which are optional to monitor and control blocking behavior of MRP domains.

mrpDomainDiagGroup: Parameters optional to monitor and control the diagnostic status of MRP domains.

mrpDomainError,
mrpDomainRingOpenCount,
mrpDomainLastRingOpenChange,
mrpDomainRoundTripDelayMax,
mrpDomainRoundTripDelayMin,
mrpDomainResetRoundTripDelays

mrpDomainAdvancedGroup:

mrpDomainVlanId: Parameters which are optional to monitor and control the status of MRP domains.

Compliance specifications

mrpDomainBasicCompliance: Basic implementation requirements for MRP support. The agent supports the monitoring and control of redundancy domains.

mrpDomainAdvancedGroup: For SNMP agents it is optional to support advanced monitoring and control of redundancy domains.

mrpDomainManagerCompliance: Manager implementation requirements for MRP support. The agent will support the monitoring and control of redundancy domains.

MANDATORY-GROUPS:

mrpDomainBasicGroup,
mrpDomainManagerGroup

mrpDomainBlockingCtrlGroup: For SNMP agents it is optional to support blocking control.

mrpDomainDiagGroup: For SNMP agents it is optional to support monitoring of the diagnostic status of MRP domains.

MRP MIB with a Proprietary Monitoring View

Monitoring MIB Definitions

TN-MRP-MIB DEFINITIONS: A MIB module provides Media Redundancy Protocol Statistics interface. { iso(1) org(3) dod(6) internet(1) private(4) enterprises(1) transition (868) products (2) tnMRP (120) }

TnMRPEventType: The MRP Event type.
 manager-role-fail (1)
 ring-open (2)
 multiple-managers (3)

TnMRPEventAppear : Event appear.
 appear (1), -- Event appears
 disappear (2) -- Event disappears

MRP statistics

tnMrpDomainStatTable: Every entry in this table contains statistics about an MRP domain. Entries cannot be created or deleted via SNMP operations.

tnMrpDomainStatEntry: An entry in the mrpDomainStatTable.

tnMrpDomainIndex: The index of the entry.

tnMrpDomainTransmitTotalCount: The total transmitted MRP protocol frames.

tnMrpDomainReceiveTotalCount: The total received MRP protocol frames.

tnMrpDomainReceiveErrorTotalCount: The total received MRP protocol frames with error.

tnMrpDomainReceiveUnrecognizedCount: The total unrecognized received frames.

tnMrpDomainStatTableReset: Write true(1) will cause a reset of all statistic values. The default is "false".

MRP Events

tnMrpDomainEventTable: Every entry in this table contains event about a Media Redundancy Protocol (MRP) domain. Entries cannot be created or deleted via SNMP operations.

tnMrpDomainEventEntry: An entry in the mrpDomainEventTable.

mrpDomainIndex: An arbitrary integer for identifying individual events within the event log. The index of the entry.

tnMrpDomainEventTimestamp: The value of *sysUpTime* at the time of the logged event.

tnMrpDomainEventType: The Event type.

tnMrpDomainEventAppear: Event appear or disappear.

tnMrpDomainEventTableReset: Write true(1) will cause a reset of all events. The default is "false".

For More MIB Information

For the list of all of the Indura SNMP Traps see “SNMP v3 Traps” in the Indura User Guide manual.

For more information on the SNMP Agent, Network Management Station (NMS), MIBS, MIB modules and MIB Variables, the Object ID (OID), the MIB Tree / branch /node, MIB Table Indices, values, notations and transaction types, etc., see the SNMP Primer at <http://www.transition.com/pshelp/snmp.html#indices>.

7. Service, Warranty & Compliance Information

Service

See the "Service" section in the online device User Guide manual for regulatory agency compliance information.

Warranty

See the "Warranty" section in the online device User Guide manual for regulatory agency compliance information.

Compliance Information

See the "Compliance Information" section in the online device User Guide manual for regulatory agency compliance information.

Cautions and Warnings

Definitions

Cautions indicate that there is the possibility of poor equipment performance or potential damage to the equipment. Warnings indicate that there is the possibility of injury to a person.

Cautions and Warnings appear here and may appear throughout this manual where appropriate. Failure to read and understand the information identified by this symbol could result in poor equipment performance, damage to the equipment, or injury to persons.

See "Electrical Safety Warnings" in the online device User Guide manual for Electrical Safety Warnings translated into multiple languages.



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