

Showing Rows 1 to 2 of 2 [1]							Next >>
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String	
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	<input type="text"/>	<input type="button" value="C"/>
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432	<input type="text"/>	<input type="button" value="C"/>
Showing Rows 1 to 2 of 2 [1]							Next >>

Choose an action:

Figure 36 Router Interfaces Management - Router Interfaces

Column	Description
Index	IF-MIB::ifIndex A unique value, greater than zero, for each interface.
Description	.1.3.6.1.4.1.9.2.2.1.1.28 Interface description.
Type	IF-MIB::ifDescr A textual string containing information (e.g. name of manufacturer, product name or version of the interface hardware/software) about the interface.
Admin Status	IF-MIB::ifAdminStatus The desired state of the interface.
Operational Status	IF-MIB::ifOperStatus The current operational state of the interface.
Current Dialer String	The value of "dialer string" setting for the dialer interface.
New Dialer String	Allows the user to specify a new dialer string.

Table 7 Router Interfaces Management - Router Interfaces Columns

The "Admin Status" and "Operational Status" columns use the coloring scheme shown in Table 8. Note that the valid values for "Admin Status" column are "Up", "Down" and "Testing", and the valid values for "Operational Status" column is any one of the values listed in the table.

Value	Color
Up	Green
Down	Red
Testing	#ED7600
Unknown	Red
Dormant	#ED7600
Not Present	Red
Lower Layer Down	Red

Table 8 Admin and Operational Status Coloring Scheme

As shown in Figure 37, the number of router interfaces displayed might span across multiple pages. The user can navigate to the next page by clicking on the "Next >>" link and navigate to the previous page by clicking on the "<< Previous" link.

Showing Rows 1 to 1 of 2 [1,2]							Next >>
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String	
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	<input type="text"/>	<input type="button" value="C"/>
Showing Rows 1 to 1 of 2 [1,2]							Next >>

Choose an action:

Figure 37 Router Dialer Strings Management – Router Interfaces

The actual number of rows displayed per page depends on the Telix setting (Configuration > Settings > Telix tab) circled in Figure 38. If this setting is not set or set with an invalid value, the factory default value is used. The factory default value is 15.

Router Dialer Strings Management Settings	
SNMP Version The SNMP version to be used.	Version 1
RD Community String R.O Community string to be used for SNMP walk and get functions.	
Router IP Address IP Address of the target router.	
Interfaces OID The OID used to perform SNMP walk function which extracts all information related to interfaces.	.1.3.6.1.2.1.2
Interfaces Description OID The OID for Interfaces Description.	.1.3.6.1.4.1.9.2.2.1.1.28
Page Refresh Interval The default time interval (in seconds) at which the Router Dialer Strings Management page is refreshed, e.g., every 30 seconds.	
Rows Displayed Per Page The number of rows displayed per page.	1
Telnet Account Username Username of the user account used to telnet the target router.	
Telnet Account Password Password of the user account used to telnet the target router.(Please enter the password twice to confirm.)	

Figure 38 Router Dialer Strings Management - Rows Displayed Per Page

1.9.2.3 Actions List

The following GUI elements on the Router Dialer Strings Management page, as shown in Figure 39, enable the user to update the dialer string of a dialer interface:

- “New Dialer String” column
- Radio button displayed next to each dialer interface
- “Choose an action” dropdown list
- “go” button

Showing Rows 1 to 2 of 2 [1]							Next >>
<< Previous	Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String
	17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	<input type="text"/>
	18	"INMAR SAT DIALER"	Dialer64	Up	Dormant	98765432	<input type="text"/>
<< Previous	Showing Rows 1 to 2 of 2 [1]						Next >>

Figure 39 Router Dialer Strings Management - Set Dialer Strings

The list of valid actions that the user can perform on a dialer interface, as defined in “Choose an action” dropdown list, is described in Table 9 below.

Action	Description
Set Dialer String	Set the dialer string of the selected dialer interface to the new value specified in the corresponding textbox in “New Dialer String” column.

Table 9 Router Dialer Strings Management Actions

To change the dialer string of a dialer interface:

1. Specify the new dialer string in the corresponding textbox in “New Dialer String” column of the dialer interface to update, as shown in Figure 40.
2. Select the corresponding radio button of the dialer interface to update, as shown in Figure 41.
3. In “Choose an action” dropdown list, select “Set Dialer String” action, as shown in Figure 42 and Figure 43.
4. Click the “go” button next to the “Choose an action” dropdown list.
5. The entire page is refreshed and reloaded, and the value of “Current Dialer String” column of the selected dialer interface has been updated, as shown in Figure 44

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	66667777		
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							go	

Figure 40 Update Dialer String - Step 1

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	66667777		
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							go	

Figure 41 Update Dialer String - Step 2

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	66667777		
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							Set Dialer String	
							go	

Figure 42 Update Dialer String - Step 3

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	66667777		
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							go	

Figure 43 Update Dialer String - Step 4

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	66667777			
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							go	

Figure 44 Update Dialer String - Step 5

If the user clicks the "go" button without selecting a dialer interface (i.e. its corresponding radio button), an error message will be displayed, as shown in Figure 45.

Error: Did not select an interface to update.

Tasks

[task: Router Dialer Strings Management]

Select a task: Router Dialer Strings Management

Router Interfaces

Page is currently refreshed at every: 300 seconds
Set page to refresh at every: seconds
go refresh
☐ Refresh entire page, including dialer strings

Notes: In order to successfully add a new dialer string for a new interface, all dependent entries/settings (e.g. dialer pool) must be set first.

Current Dialer String column last refreshed at: 04-02-2007 20:36:07 CST

<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String		
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678			
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432			
<< Previous		Showing Rows 1 to 2 of 2 [1]					Next >>	
							Choose an action: Set Dialer String	
							go	

Figure 45 Update Dialer Interface Error - No Selection

If the user has selected a dialer interface to update (by selecting the corresponding radio button) but did not specify the new dialer string and then clicked the “go” button, an error message will be displayed, as shown in Figure 46.

Error: New dialer string is either an empty string or a string that only contains whitespace characters.

Tasks [task: Router Dialer Strings Management]

Select a task: Router Dialer Strings Management

Router Interfaces

Page is currently refreshed at every: 300 seconds

Set page to refresh at every: seconds go refresh ☐ Refresh entire page, including dialer strings

Notes: In order to successfully add a new dialer string for a new interface, all dependent entries/settings (e.g. dialer pool) must be set first.

Current Dialer String column last refreshed at: 04-02-2007 20:36:07 CST

<< Previous Showing Rows 1 to 2 of 2 [1] Next >>

Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String	
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678	<input type="text"/>	↻
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432	<input type="text"/>	↻

<< Previous Showing Rows 1 to 2 of 2 [1] Next >>

Choose an action: Set Dialer String go

Figure 46 Update Dialer String Error - No Dialer String

2 Telix Requirements and Design

2.1 Telix Requirements

The requirements for Telix Cacti plugin are as follows:

- Req 1. The user must be able to view and monitor the current state of router interfaces in a specified router, and also has the ability to change the admin status of router interfaces.

The state of a router interface is defined by the values of the following properties of a router interface at a specific point of time:

- a. Interface Index (IF-MIB::ifIndex)
- b. Interface Description (.1.3.6.1.4.1.9.2.2.1.1.28)
- c. Interface Type (IF-MIB::ifDescr)
- d. Admin Status (IF-MIB::ifAdminStatus)
- e. Operational Status (IF-MIB::ifOperStatus)

The set of router interfaces displayed are those whose interface description (.1.3.6.1.4.1.9.2.2.1.1.28) is not an empty string.

The protocol used to communicate with router to extract the state of router interfaces is SNMP.

- Req 2. The user must be able to view and monitor the current state of router interfaces in a specified router, but does not have the ability to change the admin status of router interfaces.

The state of a router interface is defined by the values of the following properties of a router interface at a specific point of time:

- a. Interface Index (IF-MIB::ifIndex)
- b. Interface Description (.1.3.6.1.4.1.9.2.2.1.1.28)
- c. Interface Type (IF-MIB::ifDescr)
- d. Admin Status (IF-MIB::ifAdminStatus)
- e. Operational Status (IF-MIB::ifOperStatus)

The set of router interfaces displayed are those whose interface description (.1.3.6.1.4.1.9.2.2.1.1.28) is not an empty string.

The protocol used to communicate with router to extract the state of router interfaces is SNMP.

- Req 3. The user must be able to change the dialer string of a dialer router interface in the specified target router. A dialer router interface is a router interface whose Type is of the format "Dialer<id>" where "<id>" is an integer that uniquely identifies the dialer interface.

- Req 4. The Telix Cacti plugin must be in line with Cacti Plugins Architecture.

- Req 5. Telix must provide user management functionality to control (grant or deny) user access to Telix functionalities.

- Req 6. Telix pages (such as the one that display the state of router interfaces) need to provide both manual refresh and adjustable automatic refresh facilities.

2.2 High Level Design

Telix comprises four separate components:

- Configurations and Settings
- Router Interfaces Management
- View Router Interfaces Status
- Router Dialer Strings Management

Configurations and Settings component is responsible for the following:

- Allow the user to configure the behaviour of Telix.
- Allow the user to configure the settings (such as those associated with SNMP functions) required in order for Telix to function correctly.
- Register Telix with Cacti.

Router Interfaces Management component is responsible for the following:

- Extract the state of router interfaces in the user specified target router using SNMP.
- Display the state of router interfaces in the target router.
- Provide facility to enable the user to change the admin status (either “Up” or “Down”) of router interfaces.
- Provide manual and adjustable automatic refresh facilities to obtain the latest state of the router interfaces in the target router.

View Router Interfaces component is responsible for the following:

- Extract the state of router interfaces in the user specified target router using SNMP.
- Display the state of router interfaces in the target router.
- Provide manual and adjustable automatic refresh facilities to obtain the latest state of the router interfaces in the target router.

Router Dialer Strings Management

- Extract the state of router interfaces in the user specified target router using SNMP.
- Display router interfaces whose Type is of the format “Dialer<id>”, i.e. dialer interfaces, in the target router.
- Display the state of the dialer interfaces in the target router.
- Provide facility to enable the user to update the dialer string of dialer interfaces.

Requirements traceability is as shown in Table 10 below.

Component	Requirements
Configurations and Settings	Req 4, Req 5
Router Interfaces Management	Req 1, Req 6
View Router Interfaces Status	Req 2, Req 6
Router Dialer Strings Management	Req 3, Req 6

Table 10 Requirements Traceability

2.2.1 Telix Source Code Files and Directory Structure

Telix files and directory structure is as follows:

```
telix
| ---- config.php
| ---- index.php
| ---- setup.php
| ---- telix.php
| ---- telix_dialer_strs.php
| ---- telix_ifs.php
| ---- telix_ifs_view.php
| ---- telix_refresh_form_dialer_strs.php
| ---- telix_refresh_form_ifs.php
| ---- telix_refresh_form_ifs_view.php
| ---- telix_select_task_form.php
| ---- telix_select_task_form_dialer_strs.php
| ---- telix_select_task_form_ifs.php
| ---- telix_select_task_form_ifs_view.php
| ---- LICENSE
| ---- README
| ---- images
|       | ---- index.php
|       | ---- tab_telix.gif
```

Figure 47 Telix Source Code Files and Directory Structure

The LICENSE file is a text file containing license related information.

The README file is a text file containing information, such as version information, change log, etc, related to Telix build release.

The “tab_telix.gif” is the Telix tab used and displayed in Cacti, as shown in Figure 48. This image file can be easily replaced but do not modify the name of this image file (i.e. use “tab_telix”) or Cacti will not be able to locate this image file (unless source code is modified).

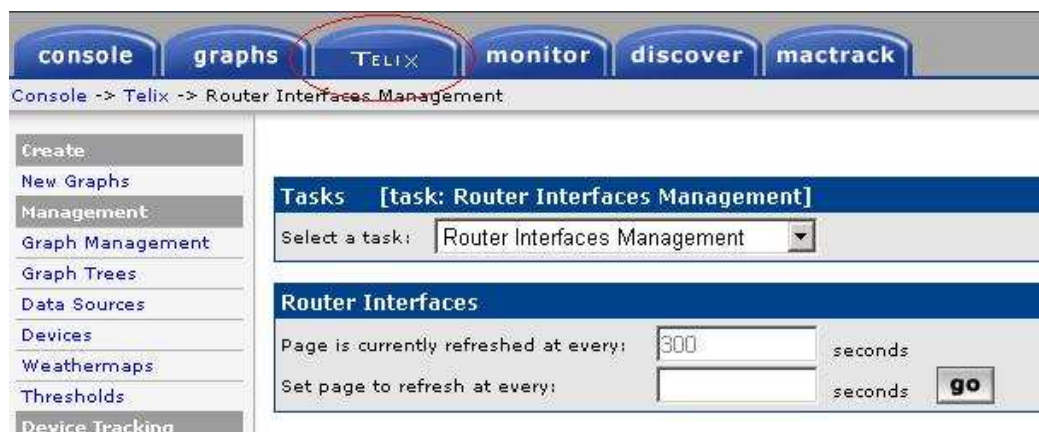


Figure 48 Telix Tab Image

2.2.1.1 Telix Components and Source Code Files

The Configurations and Settings component is implemented within the following source code files (see Figure 47):

- config.php
- settings.php

The Router Interfaces Management component is implemented within the following source code files (see Figure 47):

- telix.php
- telix_ifs.php
- telix_select_task_form_ifs.php
- telix_refresh_form_ifs.php

The View Router Interfaces Status component is implemented within the following source code files (see Figure 47):

- telix.php
- telix_ifs_view.php
- telix_refresh_form_ifs_view.php
- telix_select_task_form_ifs_view.php

The Router Dialer Strings Management component is implemented within the following source code files (see Figure 47):

- telix.php
- telix_dialer_strs.php
- telix_refresh_form_dialer_strs.php
- telix_select_task_form_dialer_strs.php

2.2.2 User Interface Design

2.2.2.1 Telix Settings

The Telix settings are implemented as Cacti settings which the user can modify within Cacti. The user interface design for Telix settings is shown in Figure 49. This page can be accessed by selecting Configuration > Settings > Telix tab.

Figure 49 Telix Settings UI Design

The list of Telix settings associated with Router Interfaces Management task is shown in Figure 50 and described in Table 11.

Figure 50 Router Interfaces Management Settings

Setting	Description
SNMP Version	The SNMP version to be used. The set of valid values for this field are:

	<ul style="list-style-type: none"> • Version 1 • Version 2c • Version 3 <p>Notes: Telix currently only supports SNMP version 1.</p>
RO Community String	The RO Community string used by SNMP walk and get functions.
RW Community String	The RW Community string used by SNMP set function.
Router IP Address	The IP address of the target router.
Interfaces OID	The OID used for SNMP walk function which extracts information, excluding interface description, associated with interfaces in the target router.
Admin Status OID	<p>The OID which identifies the admin status associated with router interfaces.</p> <p>Notes: The admin status associated with router interface is uniquely identified by using this OID with “.<if_index>” appended to it, where <if_index> is the interface index assigned to the router interface.</p>
Interfaces Description OID	<p>The OID which identifies the description associated with a router interface.</p> <p>Notes: The description associated with a router interface is uniquely identified by using this OID with “.<if_index>” appended to it, where <if_index> is the interface index assigned to the router interface.</p>
Page Refresh Interval	The default refresh time interval (in seconds) at which the Router Interfaces Management page is automatically refreshed, e.g., every 30 seconds.
Rows Displayed Per Page	The number of rows displayed per page for Router Interfaces Management.

Table 11 Router Interfaces Management Settings Description

The list of Telix settings associated with View Router Interfaces Status task is shown in Figure 51 and described in Table 12.

Figure 51 View Router Interface Status Settings

Setting	Description
SNMP Version	<p>The SNMP version to be used. The set of valid values for this field are:</p> <ul style="list-style-type: none"> • Version 1 • Version 2c • Version 3 <p>Notes: Telix currently only supports SNMP version 1.</p>
RO Community String	The RO Community string used by SNMP walk and get functions.

Router IP Address	The IP address of the target router.
Interfaces OID	The OID used for SNMP walk function which extracts information, excluding interface description, associated with interfaces in target router.
Interfaces Description OID	<p>The OID which identifies description associated with a router interface.</p> <p>Notes: The description associated with a router interface is uniquely identified by using this OID with “.<if_index>” appended to it, where <if_index> is the interface index assigned to the router interface.</p>
Page Refresh Interval	The default refresh time interval (in seconds) at which the View Router Interfaces Status page is automatically refreshed, e.g., every 30 seconds.
Rows Displayed Per Page	The number of rows displayed per page for View Router Interfaces Status.

Table 12 View Router Interfaces Status Settings Description

The list of Telix settings associated with Router Dialer Strings Management task is shown in Figure 52 and described in Table 13.

Router Dialer Strings Management Settings

SNMP Version
The SNMP version to be used.

RO Community String
RO Community string to be used for SNMP walk and get functions.

Router IP Address
IP Address of the target router.

Interfaces OID
The OID used to perform SNMP walk function which extracts all information related to interfaces.

Interfaces Description OID
The OID for Interfaces Description.

Page Refresh Interval
The default time interval (in seconds) at which the Router Dialer Strings Management page is refreshed, e.g., every 30 seconds.

Rows Displayed Per Page
The number of rows displayed per page.

Telnet Account Username
Username of the user account used to telnet the target router.

Telnet Account Password
Password of the user account used to telnet the target router. (Please enter the password twice to confirm.)

Figure 52 Router Dialer Strings Management Settings

Setting	Description
SNMP Version	<p>The SNMP version to be used. The set of valid values for this field are:</p> <ul style="list-style-type: none"> • Version 1 • Version 2c • Version 3 <p>Notes: Telix currently only supports SNMP version 1.</p>
RO Community String	The RO Community string used by SNMP walk and get functions.
Router IP Address	The IP address of the target router.
Interfaces OID	The OID used for SNMP walk function which extracts information, excluding interface description, associated with interfaces in target router.
Interfaces Description OID	<p>The OID which identifies description associated with a router interface.</p> <p>Notes: The description associated with a router interface is uniquely identified by using this OID with “.<if_index>” appended to it, where <if_index> is the interface index assigned to the router interface.</p>

Page Refresh Interval	The default refresh time interval (in seconds) at which the Router Dialer Strings Management page is automatically refreshed, e.g., every 30 seconds.
Rows Displayed Per Page	The number of rows displayed per page for Router Dialer Strings Management.
Telnet Account Username	Username of the Telnet account used to login and communicate with the target router.
Telnet Account Password	Password of the Telnet account used to login and communicate with the target router.

Table 13 Router Dialer Strings Management Settings Description

2.2.2.2 Router Interfaces Management

The Router Interfaces Management user interface design is shown in Figure 53. This page comprises two sections:

- Tasks
- Router Interfaces

The Tasks section enables the user to:

- View the currently selected task
- View the list of tasks that the user has the permissions to access and perform
- Select another task to perform

The Router Interfaces section enables the user to:

- Manually refresh the page to obtain the latest, current state of the router interfaces whose description is set.
- View the current automatic refresh time interval, which is in seconds.
- Modify the automatic refresh time interval, which is in seconds.
- View the current state of the router interfaces.
- Modify the admin status (either "Up" or "Down") of router interfaces.

Tasks
[task: Router Interfaces Management]

Select a task: Router Interfaces Management

Router Interfaces

Page is currently refreshed at every: 300 seconds
Set page to refresh at every: seconds
go refresh

WARNING:
Telix uses one of the following router interfaces to communicate with the target router (e.g. FastEthernet0/1).
DO NOT change the Admin Status of this router interface to DOWN as this will terminate the communication between Telix and the target router, as well as communications between any other devices/computers and the target router through this router interface.

Index	Description	Type	Admin Status	Operational Status
1	"NINSHORE"	FastEthernet0/0	Up	Up
2	"SHIPS INTERNAL LAN"	FastEthernet0/1	Up	Up
5	"INMARSAT B"	Serial1/2	Up	Down
12	"INTERNAL MODEM 1"	Async1	Up	Down
13	"DIALIN DMVPN"	Tunnel50	Up	Up
14	"NINSHORE AND WIRELESS DMVPN"	Tunnel100	Up	Up
15	"TUNNEL 50 SOURCE"	Loopback71	Up	Up
16	"TUNNEL 100 SOURCE"	Loopback171	Up	Up
17	"MODEM DIALER"	Dialer56	Up	Dormant
18	"INMARSAT DIALER"	Dialer64	Up	Dormant

Choose an action: Admin Status Up go

Figure 53 Router Interfaces Management User Interface Design

2.2.2.3 View Router Interfaces Status

The View Router Interfaces Status user interface design is shown in Figure 54. This page comprises two sections:

- Tasks
- Router Interfaces

The Tasks section enables the user to:

- View the currently selected task
- View the list of tasks that the user has the permissions to access and perform
- Select another task to perform

The Router Interfaces section enables the user to:

- Manually refresh the page to obtain the latest, current state of the router interfaces whose description is set.
- View the current automatic refresh time interval, which is in seconds.
- Modify the automatic refresh time interval, which is in seconds.
- View the current state of the router interfaces.

The screenshot shows a web interface with two main sections. The top section, titled 'Tasks', contains a dropdown menu labeled 'Select a task:' with 'View Router Interfaces Status' selected. The bottom section, titled 'Router Interfaces', contains a form for refreshing the page. It has a text input 'Page is currently refreshed at every: 300 seconds' and a 'go' button. Below this is another text input 'Set page to refresh at every: ' seconds and a 'refresh' button. The main part of the interface is a table with 5 columns: Index, Description, Type, Admin Status, and Operational Status. The table shows 18 rows of data, including interfaces like 'NINSHORE', 'SHIPS INTERNAL LAN', 'INMARSAT B', 'INTERNAL MODEM 1', 'DIALIN DMVPN', 'NINSHORE AND WIRELESS DMVPN', 'TUNNEL 50 SOURCE', 'TUNNEL 100 SOURCE', 'MODEM DIALER', and 'INMARSAT DIALER'. The table is paginated, showing rows 1 to 10 of 10 [1].

Index	Description	Type	Admin Status	Operational Status
1	"NINSHORE"	FastEthernet0/0	Up	Up
2	"SHIPS INTERNAL LAN"	FastEthernet0/1	Up	Up
5	"INMARSAT B"	Serial1/2	Up	Down
12	"INTERNAL MODEM 1"	Async1	Up	Down
13	"DIALIN DMVPN"	Tunnel150	Up	Up
14	"NINSHORE AND WIRELESS DMVPN"	Tunnel100	Up	Up
15	"TUNNEL 50 SOURCE "	Loopback71	Up	Up
16	"TUNNEL 100 SOURCE"	Loopback171	Up	Up
17	"MODEM DIALER"	Dialer56	Up	Dormant
18	"INMARSAT DIALER"	Dialer64	Up	Dormant

Figure 54 View Router Interfaces Status User Interface Design

2.2.2.4 Router Dialer Strings Management

The Router Dialer Strings Management user interface design is shown in Figure 55. This page comprises two sections:

- Tasks
- Router Interfaces

The Tasks section enables the user to:

- View the currently selected task
- View the list of tasks that the user has the permissions to access and perform
- Select another task to perform

The Router Interfaces section enables the user to:

- Manually refresh the page to obtain the latest, current state of the dialer router interfaces whose description is set, excluding dialer string property of the dialer interface.
- Manually refresh the page to obtain the latest, current state of the dialer router interfaces whose description is set, including dialer string property of the dialer interface.
- View the current automatic refresh time interval, which is in seconds.

- Modify the automatic refresh time interval, which is in seconds.
- View the current state of the dialer interfaces.
- Modify dialer string property of dialer interfaces.

Tasks

[task: Router Dialer Strings Management]

Select a task:

Router Dialer Strings Management

Router Interfaces

Page is currently refreshed at every:

300

seconds

Set page to refresh at every:

seconds

go

refresh

☐ Refresh entire page, including dialer strings

Notes:

In order to successfully add a new dialer string for a new interface, all dependent entries/settings (e.g. dialer pool) must be set first.

'Current Dialer String' column last refreshed at:

04-02-2007 02:54:40 CST

<< Previous

Showing Rows 1 to 2 of 2 [1]

Next >>

Index	Description	Type	Admin Status	Operational Status	Current Dialer String	New Dialer String	
17	"MODEM DIALER"	Dialer56	Up	Dormant	12345678		
18	"INMARSAT DIALER"	Dialer64	Up	Dormant	98765432		

<< Previous

Showing Rows 1 to 2 of 2 [1]

Next >>

Choose an action:

Set Dialer String

go

Figure 55 Router Dialer Strings Management User Interface Design

2.3 Detailed Design

2.3.1 Router Interfaces Management

The main algorithm used to implement Router Interfaces Management is as follows:

1. If the user triggered an action, process and perform the action (e.g. using SNMP function `snmpset` to change admin status) selected by the user.
2. Get automatic refresh time interval and store the value in `$refresh` (`$refresh` is actually an array with two elements whose keys are "page" and "seconds". The value of the entry whose key is "page" specifies which page to load when automatic refresh is triggered. The value of the entry whose key is "seconds" specifies the automatic refresh time interval in seconds).
3. Destroy any session variables used by other Telix pages, and create and initialise session variables for this page.
4. Get the current state of the router interfaces using SNMP function `snmpwalk`, and store the result in `$status` (the output of SNMP walk function has already been parsed and processed and `$status` is a data structure which stores the processed data). (Notes: This step is implemented in "get_interface_status" function in source code file "telix_ifs.php".)
5. Create a new array called `$trimmed_status`, which is a subset of `$status`, so that the array only contains data to be displayed in current page (Notes: The user can specify the number of rows displayed per page using Telix settings. The number of router interfaces found may be greater than the number of rows the user has set to display on the page. Therefore the router interfaces will span across multiple pages. This step determines which page the user is viewing and extracts data to be displayed on the current page.). (Notes: This step is implemented in "trim_array" function in source code file "telix_ifs.php".)
6. Generate HTML code to display the Router Interfaces Management page using `$status`, `$trimmed_status` and `$refresh`.

2.3.1.1 Router Interfaces State Extraction and Processing

This section provides details on steps 4 and 5 of the algorithm described in section 2.3.1.

When `net-snmp` is installed, and a `snmpwalk` command is executed (e.g. using Windows command prompt) using the OID specified by Telix setting "Interfaces OID" for Router Interfaces Management (e.g. .1.3.6.1.2.1.2), details of router interfaces in the target router is displayed, as shown below in Figure 56:

```
IF-MIB::ifNumber.0 = INTEGER: 14
IF-MIB::ifIndex.1 = INTEGER: 1
IF-MIB::ifIndex.2 = INTEGER: 2
IF-MIB::ifIndex.3 = INTEGER: 3
IF-MIB::ifIndex.4 = INTEGER: 4
IF-MIB::ifIndex.5 = INTEGER: 5
IF-MIB::ifIndex.6 = INTEGER: 6
IF-MIB::ifIndex.7 = INTEGER: 7
IF-MIB::ifIndex.12 = INTEGER: 12
IF-MIB::ifIndex.13 = INTEGER: 13
IF-MIB::ifIndex.14 = INTEGER: 14
IF-MIB::ifIndex.15 = INTEGER: 15
IF-MIB::ifIndex.16 = INTEGER: 16
IF-MIB::ifIndex.17 = INTEGER: 17
```

```

IF-MIB::ifIndex.18 = INTEGER: 18
IF-MIB::ifDescr.1 = STRING: FastEthernet0/0
IF-MIB::ifDescr.2 = STRING: FastEthernet0/1
IF-MIB::ifDescr.3 = STRING: Serial1/0
IF-MIB::ifDescr.4 = STRING: Serial1/1
IF-MIB::ifDescr.5 = STRING: Serial1/2
IF-MIB::ifDescr.6 = STRING: Serial1/3
IF-MIB::ifDescr.7 = STRING: Null0
IF-MIB::ifDescr.12 = STRING: Async1
IF-MIB::ifDescr.13 = STRING: Tunnel50
IF-MIB::ifDescr.14 = STRING: Tunnel100
IF-MIB::ifDescr.15 = STRING: Loopback71
IF-MIB::ifDescr.16 = STRING: Loopback171
IF-MIB::ifDescr.17 = STRING: Dialer56
IF-MIB::ifDescr.18 = STRING: Dialer64
...
IF-MIB::ifAdminStatus.1 = INTEGER: up(1)
IF-MIB::ifAdminStatus.2 = INTEGER: up(1)
IF-MIB::ifAdminStatus.3 = INTEGER: up(1)
IF-MIB::ifAdminStatus.4 = INTEGER: up(1)
IF-MIB::ifAdminStatus.5 = INTEGER: up(1)
IF-MIB::ifAdminStatus.6 = INTEGER: up(1)
IF-MIB::ifAdminStatus.7 = INTEGER: up(1)
IF-MIB::ifAdminStatus.12 = INTEGER: up(1)
IF-MIB::ifAdminStatus.13 = INTEGER: up(1)
IF-MIB::ifAdminStatus.14 = INTEGER: up(1)
IF-MIB::ifAdminStatus.15 = INTEGER: up(1)
IF-MIB::ifAdminStatus.16 = INTEGER: up(1)
IF-MIB::ifAdminStatus.17 = INTEGER: up(1)
IF-MIB::ifAdminStatus.18 = INTEGER: up(1)
IF-MIB::ifOperStatus.1 = INTEGER: up(1)
IF-MIB::ifOperStatus.2 = INTEGER: up(1)
IF-MIB::ifOperStatus.3 = INTEGER: down(2)
IF-MIB::ifOperStatus.4 = INTEGER: down(2)
IF-MIB::ifOperStatus.5 = INTEGER: down(2)
IF-MIB::ifOperStatus.6 = INTEGER: down(2)
IF-MIB::ifOperStatus.7 = INTEGER: up(1)
IF-MIB::ifOperStatus.12 = INTEGER: down(2)
IF-MIB::ifOperStatus.13 = INTEGER: up(1)
IF-MIB::ifOperStatus.14 = INTEGER: up(1)
IF-MIB::ifOperStatus.15 = INTEGER: up(1)
IF-MIB::ifOperStatus.16 = INTEGER: up(1)
IF-MIB::ifOperStatus.17 = INTEGER: dormant(5)
IF-MIB::ifOperStatus.18 = INTEGER: dormant(5)
...

```

Figure 56 Output of snmpwalk command of net-snmp

The output of snmpwalk function call (which is part of SNMP library installed for PHP) in Telix is shown in Figure 57:

```

INTEGER: 14
INTEGER: 1
INTEGER: 2
INTEGER: 3
INTEGER: 4
INTEGER: 5
INTEGER: 6
INTEGER: 7
INTEGER: 12
INTEGER: 13

```



```

INTEGER: 14
INTEGER: 15
INTEGER: 16
INTEGER: 17
INTEGER: 18
STRING: FastEthernet0/0
STRING: FastEthernet0/1
STRING: Serial1/0
STRING: Serial1/1
STRING: Serial1/2
STRING: Serial1/3
STRING: Null0
STRING: Async1
STRING: Tunnel50
STRING: Tunnel100
STRING: Loopback71
STRING: Loopback171
STRING: Dialer56
STRING: Dialer64
...
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: down(2)
INTEGER: down(2)
INTEGER: down(2)
INTEGER: down(2)
INTEGER: up(1)
INTEGER: down(2)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: up(1)
INTEGER: dormant(5)
INTEGER: dormant(5)
...

```

Figure 57 Output of snmpwalk function to obtain interfaces details

In addition, a snmpwalk function call is also made on the OID specified by Teiix setting "Interfaces Description OID" (e.g. .1.3.6.1.4.1.9.2.2.1.1.28) for Router Interfaces Management, and the output is shown in Figure 58:

```

STRING: "NINSHORE"
STRING: "SHIPS INTERNAL LAN"
" "
" "
STRING: "INMARSAT B"

```

```

" "
" "
STRING: "INTERNAL MODEM 1"
STRING: "DIALIN DMVPN"
STRING: "NINSHORE AND WIRELESS DMVPN"
STRING: "TUNNEL 50 SOURCE "
STRING: "TUNNEL 100 SOURCE"
STRING: "MODEM DIALER"
STRING: "INMARSAT DIALER"

```

Figure 58 Output of snmpwalk function to obtain interfaces description

Using the output of snmpwalk command of net-snmp as reference (see Figure 56), the output of snmpwalk function calls (as shown in Figure 57 and Figure 58) are parsed and put into a data structure shown in Figure 59:

```

$status =
{
  "interface_indices" =>
    {1, 2, 3, 4, 5, 6, 7, 12, 13, 14, 15, 16, 17, 18},

  "interface_desc" =>
    {1 => "NINSHORE",
     2 => "SHIPS INTERNAL LAN",
     3 => "",
     4 => "",
     5 => "INMARSET B",
     6 => "",
     7 => "",
     12 => "INTERNAL MODEM 1",
     13 => "DIALIN DMVPN",
     14 => "NINSHORE AND WIRELESS DMVPN",
     15 => "TUNNEL 50 SOURCE",
     16 => "TUNNET 100 SOURCE",
     17 => "MODEM DIALER",
     18 => "INMARSET DIALER"},

  "interface_type" =>
    {1 => "FastEthernet0/0",
     2 => "FastEthernet0/1",
     3 => "Serial1/0",
     4 => "Serial1/1",
     5 => "Serial1/2",
     6 => "Serial1/3",
     7 => "Null0",
     12 => "Async1",
     13 => "Tunnel50",
     14 => "Tunnel100",
     15 => "Loopback71",
     16 => "Loopback171",
     17 => "Dialer56",
     18 => "Dialer64"},

  "interface_admin_status" =>
    {1 => 1,
     2 => 1,
     3 => 1,
     4 => 1,
     5 => 1,
     6 => 1,

```

```

7 => 1,
12 => 1,
13 => 1,
14 => 1,
15 => 1,
16 => 1,
17 => 1,
18 => 1"},

"interface_op_status" =>
{1 => 1,
2 => 1,
3 => 2,
4 => 2,
5 => 2,
6 => 2,
7 => 1,
12 => 2,
13 => 1,
14 => 1,
15 => 1,
16 => 1,
17 => 5,
18 => 5"}

}

```

Figure 59 Router Interfaces State Data Structure

The next step is to determine which page the user is current is viewing and extract the subset of data stored in \$status and put it in another array called \$trimmed_array.

The set of router interfaces whose description is not set will not be displayed and they are removed first. Therefore, conceptually (implementation does not actually do this as it is less efficient), we have a new, updated array as shown in Figure 60:

```

$updated_status =
{
  "interface_indices" =>
    {1, 2, 5, 12, 13, 14, 15, 16, 17, 18},

  "interface_desc" =>
    {1 => "NINSHORE",
     2 => "SHIPS INTERNAL LAN",
     5 => "INMARSET B",
     12 => "INTERNAL MODEM 1",
     13 => "DIALIN DMVPN",
     14 => "NINSHORE AND WIRELESS DMVPN",
     15 => "TUNNEL 50 SOURCE",
     16 => "TUNNET 100 SOURCE",
     17 => "MODEM DIALER",
     18 => "INMARSET DIALER"},

  "interface_type" =>
    {1 => "FastEthernet0/0",
     2 => "FastEthernet0/1",
     5 => "Serial1/2",
     12 => "Async1",
     13 => "Tunnel50",

```

```

14 => "Tunnel100",
15 => "Loopback71",
16 => "Loopback171",
17 => "Dialer56",
18 => "Dialer64"},

"interface_admin_status" =>
{1 => 1,
 2 => 1,
 5 => 1,
12 => 1,
13 => 1,
14 => 1,
15 => 1,
16 => 1,
17 => 1,
18 => 1"},

"interface_op_status" =>
{1 => 1,
 2 => 1,
 5 => 2,
12 => 2,
13 => 1,
14 => 1,
15 => 1,
16 => 1,
17 => 5,
18 => 5"}

}

```

Figure 60 Updated Router Interfaces State Data Structure

Suppose that the user set the Telix setting "Rows Displayed Per Page" for Router Interfaces Management to 3, and the user is currently viewing page 2, then the data shown in Figure 60 is further updated so the final data to display (step 5 of section 2.3.1.) is as shown in Figure 61:

```

$trimmed_status =
{
  "interface_indices" =>
    {12, 13, 14},

  "interface_desc" =>
    {12 => "INTERNAL MODEM 1",
      13 => "DIALIN DMVPN",
      14 => "NINSHORE AND WIRELESS DMVPN"},

  "interface_type" =>
    {12 => "Async1",
      13 => "Tunnel50",
      14 => "Tunnel100"},

  "interface_admin_status" =>
    {12 => 1,
      13 => 1,
      14 => 1},
}

```

```

"interface_op_status" =>
{
  12 => 2,
  13 => 1,
  14 => 1}
}

```

Figure 61 Final Router Interfaces State to be displayed

The admin status and operational status are converted from integer format to textual format when generating HTML code for Router Interfaces Management page.

2.3.2 View Router Interfaces Status

The algorithms and data structures used for View Router Interfaces Status page are similar to Router Interfaces Management. The differences are:

- View Router Interfaces Status does not check user actions as it does not support any.
- View Router Interfaces Status does not generate HTML code for radio buttons which enables the user to select a router interface displayed.
- View Router Interfaces Status does not generate HTML code for “Choose an action” dropdown list which enables the user to select a supported action on router interfaces.
- View Router Interfaces Status does not generate HTML code for the “go” button which triggers the action selected.

For more details on algorithm and data structures used, see section 2.3.1.

2.3.3 Router Dialer Strings Management

The main algorithm used to implement Router Dialer Strings Management is as follows:

1. If the user triggered an action, process and perform the action (e.g. using update dialer string by creating a Telnet child process) selected by the user.
2. Get automatic refresh time interval and store the value in \$refresh (\$refresh is actually an array with two elements whose keys are “page” and “seconds”. The value of the entry whose key is “page” specifies which page to load when automatic refresh is triggered. The value of the entry whose key is “seconds” specifies the automatic refresh time interval in seconds).
3. Destroy any session variables used by other Telix pages, and create and initialise session variables for this page.
4. Get the current state of the router interfaces using SNMP walk, and store the result in \$status (the output of SNMP walk function has already been parsed and processed and \$status is a data structure which stores the processed data). (Notes: This step is implemented in “get_interface_status” function in source code file “telix_dialer_strs.php”).
5. Update \$status array by removing router interfaces whose Type is not of the format “Dialer<id>” where <id> is an integer that uniquely identifies the router interface. This process is similar to step 6. (Notes: This step is implemented in “trim_none_dialers” function in source code file “telix_dialer_strs.php”).
6. Create a new array called \$trimmed_status, which is a subset of \$status, so that the array only contains data to be displayed in current page (Notes: The user can specify the number of rows displayed per page using Telix settings. The number of router interfaces found may be greater than the number of rows the user has set to display on the page. Therefore the router interfaces will span across multiple pages. This step determines which page the user is viewing and extracts data to be displayed on the current page. This step is implemented in “trim_array” function in source code file “telix_dialer_strs.php”).

7. Generate HTML code to display the Router Dialer Strings Management page using \$status, \$trimmed_status and \$refresh.

Router Dialer Strings Management page uses the following PHP functions to update dialer string of a dialer interface:

- proc_open (used to create a child Telnet process and required stdin, stdout and stderr pipes)
- stream_set_blocking (to change stdin, stdout and stderr pipes to non-blocking mode)
- fwrite (write data to stdin of the Telnet process)
- fgets (read data from stdout and stderr of the Telnet process)
- proc_close (to close the Telnet process)

The list of commands send to router during the Telnet session is:

- show running-config interface dialer <id>
- configure terminal
- interface dialer <id>
- dialer string
- no dialer string
- exit (to close the Telnet session)

2.4 API

This section list all the functions, and important variables and constants within Telix source code files.

2.4.1 config.php

2.4.1.1.1 Variables

Variable/Configuration	Description
\$telix_ifs_realm_id	Stores the realm ID assigned to Router Interfaces Management functionality.
\$telix_dialer_strs_realm_id	Stores the realm ID assigned to Router Dialer Strings Management functionality.
\$telix_ifs_view_realm_id	Stores the realm ID assigned to View Router Interfaces Status functionality.
\$telix_tab	Set this variable to TRUE if Telix should be accessed in Cacti via Telix tab (Telix menu item will not be displayed); set this variable to FALSE if Telix should be accessed in Cacti via menu item under Utilities menu (Telix tab will not be displayed).

For more information regarding the purpose of these variables, consult Telix user manual.

2.4.2 setup.php

2.4.2.1 Functions

Function	Description
plugin_init_telix	Cacti (Cacti Plugins Architecture) implements a number of hooks to allow plugins to modify the behavior of Cacti. This function is responsible for registering a number of Telix functions so that they are called within the hooks.
telix_version	Returns Telix version information.
telix_show_tab	This function is responsible to print the HTML code required to display Telix tab in Cacti when both of the followings are true: <ul style="list-style-type: none">• User has the permission to access at least one realm/functionality defined by Telix.• Telix access method is Telix tab (as oppose to use menu item).
telix_config_arrays	This function is responsible for defining and registering Telix realms, and also to add a menu item when Telix access method is menu (as oppose to using Telix tab).
telix_draw_navigation_text	This function is responsible for defining navigational bar for each Telix web page.
telix_config_settings	This function is responsible for implementing Telix settings. It defines three new arrays, where each array defines settings for

	a Telix task, such as Router Interfaces Management, and registers those three arrays with Cacti. For each array that defines settings for a Telix task, each element of the array defines one of the settings. The definition of each setting includes specifying the unique name used to identify the setting, description for the setting, GUI element (HTML element) to be used for this setting, etc.
--	---

2.4.3 telix_ifs.php

2.4.3.1 Constants

Constant	Description
FACTORY_DEFAULT_IFS_REFRESH_RATE	The factory default value for automatic refresh time interval (in seconds) for Router Interfaces Management page.
FACTORY_DEFAULT_ROWS_PER_PAGE	The factory default value for number of rows (i.e. router interfaces) displayed per page for Router Interfaces Management page.

2.4.3.2 Variables

Variable	Description
\$interface_actions	Defines the valid values (i.e. actions) that are shown in "Choose an action" dropdown list.
\$_REQUEST["action"]	This global variable is set to 'actions' if user triggered an action. If user did not trigger an action and the page is just being refreshed, this variable will not be set.

2.4.3.3 Functions

Function	Description
get_refresh_interval	Returns the automatic refresh time interval for the current session. If the user specified a new value, this function will update the session variable used to keep track of the automatic refresh time interval for Router Interfaces Management. If the user did not specify what the default automatic refresh time interval should be in Telix settings, then this function will use the factory default value FACTOR_DEFAULT_IFS_REFRESH_RATE when the user access the page for the first time.
set_session_variables	This functions destroys session variables used by other Telix pages (to avoid conflict),

	and creates and initialises session variables used by Router Interfaces Management.
display_telix_ifs_page	Generates HTML code for Router Interfaces Management page.
get_interface_status	Uses SNMP function snmpwalk to obtain the state of the router interfaces in the target router, and process the output and store it in an appropriate data structure. Returns this data structure.
status_to_str	Converts admin status and operational status from integer format to textual format.
form_actions	Process the action the user triggered, which involves invoking the function that actually process the selected action, and then redisplay the page.
form_action_set_admin_status	Process either the "Admin Status Up" or "Admin Status Down" action using SNMP function snmpset.
trim_array	Returns a new array, which is a subset of the array returned by get_interface_status function, so that the new array contains only data to be displayed on the current page that the user is viewing.

2.4.4 telix_select_task_form_ifs.php

This file generates the HTML code for the contents of the "Tasks" section of the Router Interfaces Management page.

2.4.4.1 Functions

Function	Description
gen_task_options_ifs	Generates HTML code for the list of tasks that the user is given the permission to access.

2.4.5 telix_refresh_form_ifs.php

This file generates the HTML code for the page refreshing subsection of the "Router Interfaces" section of the Router Interfaces Management page.

2.4.5.1 Functions

Function	Description
get_ifs_refresh_interval	Returns the current automatic refresh time interval for Router Interfaces Management.

2.4.6 telix_ifs_view.php

2.4.6.1 Constants

Constant	Description
FACTORY_DEFAULT_IFS_VIEW_REFRESH_RATE	The factory default value for automatic refresh time interval (in seconds) for View Router Interfaces Status page.
FACTORY_DEFAULT_IFS_VIEW_ROWS_PER_PAGE	The factory default value for number of rows (i.e. router interfaces) displayed per page for View Router Interfaces Status page.

2.4.6.2 Functions

Function	Description
get_refresh_interval	Returns the automatic refresh time interval for the current session. If the user specified a new value, this function will update the session variable used to keep track of the automatic refresh time interval for View Router Interfaces Status. If the user did not specify what the default automatic refresh time interval should be in Telix settings, then this function will use the factory default value FACTORY_DEFAULT_IFS_VIEW_REFRESH_RATE when the user accesses the page the first time.
set_session_variables	This function destroys session variables used by other Telix pages (to avoid conflict), and creates and initialises session variables used by View Router Interfaces Status.
display_telix_ifs_view_page	Generates HTML code for View Router Interfaces Status page.
get_interface_status	Uses SNMP function snmpwalk to obtain the state of the router interfaces in the target router, and process the output and store it in an appropriate data structure. Returns this data structure.
status_to_str	Converts admin status and operational status from integer format to textual format.
trim_array	Returns a new array, which is a subset of the array returned by get_interface_status function, so that the new array contains only data to be displayed on the current page that the user is viewing.

2.4.7 telix_select_task_form_ifs_view.php

This file generates the HTML code for the contents of the “Tasks” section of the View Router Interfaces Status page.

2.4.7.1 Functions

Function	Description
gen_task_options_ifs_view	Generates HTML code for the list of tasks that the user is given the permission to access.

2.4.8 telix_refresh_form_ifs_view.php

This file generates the HTML code for the page refreshing subsection of the “Router Interfaces” section of the View Router Interfaces Status page.

2.4.8.1 Functions

Function	Description
get_ifs_view_refresh_interval	Returns the current automatic refresh time interval for View Router Interfaces Status.

2.4.9 telix_dialer_strs.php

2.4.9.1 Constants

Constant	Description
FACTORY_DEFAULT_DIALER_STRS_REFRESH_RATE	The factory default value for automatic refresh time interval for Router Dialer Strings Management page.
FACTORY_DEFAULT_ROWS_PER_PAGE	The factory default value for number of rows (i.e. router interfaces) displayed per page for Router Dialer Strings Management page.
TELNET_LOGIN_ATTEMPTS	The number of Telnet login attempts. This is set to 1 less than the number of attempts permitted before remote host closes the connection.
TELNET_SESSION_CLEANUP_DURATION	The amount of time, in seconds, that the script will sleep after calling the

	proc_close function to close the Telnet process. This is used to allow the Telnet process to finish cleanup.
ROUTER_CMD_SHOW_IF	Set to "show running-config interface dialer ". The router command used to get the current dialer string of dialer interfaces.
ROUTER_CMD_CONFIG	Set to "configure terminal". Part of the sequence of router commands used to reconfigure dialer string of a dialer interface.
ROUTER_CMD_IF	Set to "interface dialer ". Part of the sequence of router commands used to reconfigure dialer string of a dialer interface.
ROUTER_CMD_SET_IF_STR	Set to "dialer string ". Part of the sequence of router commands used to reconfigure dialer string of the dialer interface.
ROUTER_CMD_UNSET_IF_STR	Set to "no dialer string ". Part of the sequence of router commands used to reconfigure dialer string of a dialer interface.
TELNET_CMDN_QUIT	Set to "exit". This is used to close the Telnet session.

2.4.9.2 Variables

Variable	Description
\$interface_actions	Defines the valid values (i.e. actions) that are shown in "Choose an action" dropdown list.
\$_REQUEST["action"]	This global variable is set to 'actions' if user triggered an action. If user did not trigger an action and the page is just being refreshed, this variable will not be set.

2.4.9.3 Functions

Function	Description
get_refresh_interval	Returns the automatic refresh time interval for the current session. If the user specified a new value, this function will update the session variable used to keep track of the automatic refresh time interval for Router Dialer Strings Management. If the user did not specify what the default automatic refresh time interval should be in Telix settings, then this function will use the factory

	default value FACTOR_DEFAULT_DIALER_STRS_REFRESH_RATE when the user accesses the page the first time.
set_session_variables	This functions destroys session variables used by other Telix pages (to avoid conflict), and creates and initialises session variables used by Router Dialer Strings Management.
display_telix_dialer_strs_page	Generates HTML code for Router Dialer Strings Management page.
get_interface_status	Uses SNMP function snmpwalk to obtain the state of the router interfaces in the target router, and process the output and store it in an appropriate data structure. Returns this data structure.
status_to_str	Converts admin status and operational status from integer format to textual format.
form_actions	Process the action the user triggered, which involves invoking the function that actually process the selected action, and then redisplay the page.
form_action_set_admin_status	Process the "Set Dialer String" action, using PHP functions proc_open, stream_set_blocking, fwrite, fgets and proc_close.
trim_array	Returns a new array, which is a subset of the array returned by trim_none_dialers function, so that the new array contains only data to be displayed on the current page that the user is viewing.
trim_none_dialers	Returns a new array, which is a subset of the array returned by get_interface_status function, so that the new array contains only data related to router interfaces whose Type is of the format "Dialer<id>", where <id> is an integer that uniquely identifies the router interface.
get_dialer_strs	Get dialer strings of the specified dialer interfaces, using PHP functions proc_open, stream_set_blocking, fwrite, fgets and proc_close.
wait_for_str	Wait for a particular line of output from child Telnet process on a specified pipe (e.g. stdout).
wait_for_str_err	Similar to wait_for_str except that this functions returns a boolean value and takes an additional error string as input. This function returns TRUE if the output line that is expected from a specified pipe is read. This function returns FALSE if the error string (instead of the expected line) is read from the specified pipe.
wait_for_str_no_trim	Similar to wait_for_str except that when a line of output is read from the specified pipe, no effort is made to try and remove leading and trailing whitespaces.

2.4.10 telix_select_task_form_dialer_strs.php

This file generates the HTML code for the contents of the "Tasks" section of the Router Dialer Strings Management page.

2.4.10.1 Functions

Function	Description
----------	-------------

gen_task_options_dialer_strs	Generates HTML code for the list of tasks that the user is given the permission to access.
------------------------------	--

2.4.11 **telix_refresh_form_dialer_strs.php**

This file generates the HTML code for the page refreshing subsection of the “Router Interfaces” section of the Router Dialer Strings Management page.

2.4.11.1 **Functions**

Function	Description
get_dialer_strs_refresh_interval	Returns the current automatic refresh time interval for Router Dialer Strings Management.

2.4.12 **telix.php**

This file generates the HTML code for the main Telix page which is displayed when the user either clicks on the Telix tab or the Telix menu item.

2.4.13 **telix_select_task_form.php**

This file generates the HTML code for the contents of the “Tasks” section of the main Telix page.

3 References

1. Cacti website
<http://www.cacti.net/>
2. Cacti Users website (provides Cacti plugins downloads and documentations),
<http://cactiusers.org/>
3. IF-MIB documentation