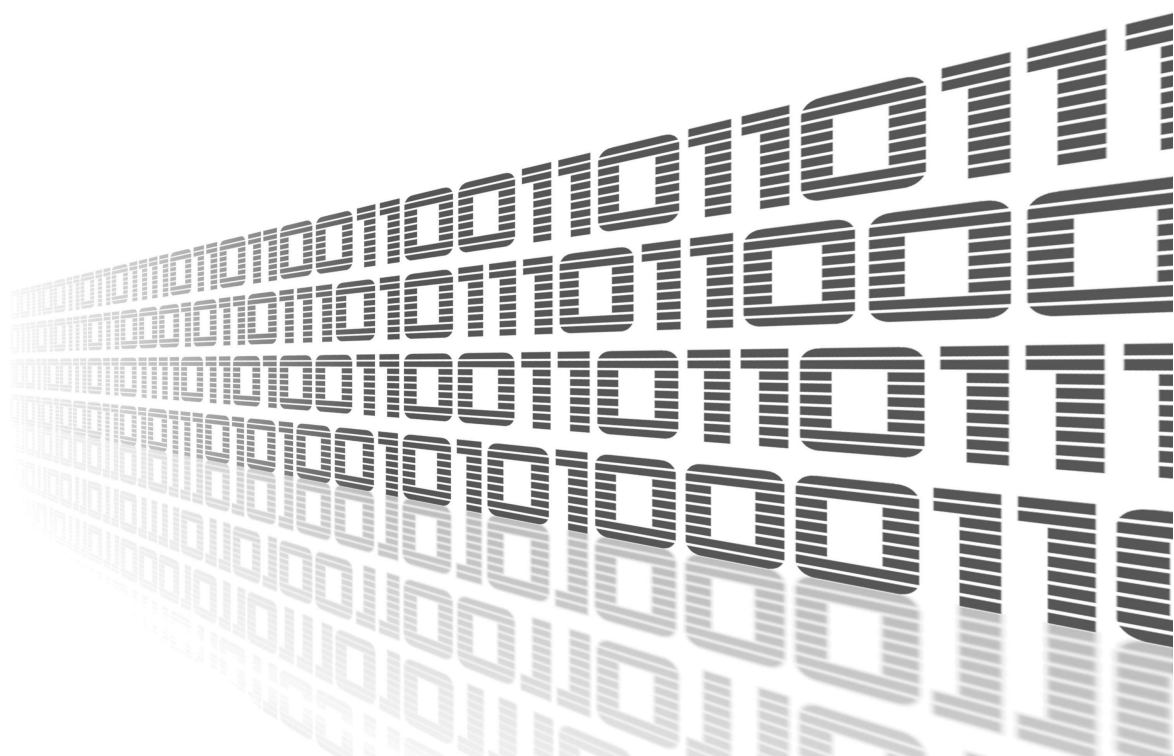# RouterApp

User Module

PIM-SM

APPLICATION NOTE

ADVANTECH

Used symbols

Danger – Information regarding user safety or potential damage to the router.

Attention – Problems that may arise in specific situations.

Information or notice – Useful tips or information of special interest.

Example – example of function, command or script.

19-01-21

www.lucom.de

Contents

List of Figures

www.lucom.de

ii

19-01-21

1. Description of user module

User module *PIM SM* is not contained in the standard router firmware. Uploading of this user module is described in the Configuration manual (see [1, 2]).

The user module is v2 and v3 router platforms compatible.

Due to this module the PIM-SM (Protocol Independent Multicast – Sparse Mode) protocol is available. It is the most commonly used multicast routing protocol that is designed on the assumption that recipients for any particular multicast group will be sparsely distributed throughout the network. In order to receive multicast data, routers must explicitly tell their upstream neighbors about their interest in particular groups and sources. PIM-SM by default uses shared trees, which are multicast distribution trees rooted at some selected node (this router is called the Rendezvous Point, RP) and used by all sources sending to the multicast group.

For configuration *PIM SM* user module is available web interface, which is invoked by pressing the module name on the *User modules* page of the router web interface. The left part of the web interface contains the menu with pages for *Configuration*, monitoring (*Status*) and *Customization* of the module. *Customization* block contains only the *Return* item, which switches this web interface to the interface of the router. In the configuration part of web interface is possible to find form which includes the following:

- **Enable PIM-SM**
  Enables activation of the module (particularly runs the application – pimd demaon) implementing PIM-SM protocol.

- **Network Interfaces**
  List of network interfaces ethX and greX in which the PIM-SM protocol will be activated. In accord with the setting of this item is set "allmulti" flag for ethX interface (e.g. eth0) and "multicast" flag for greX interface (e.g. gre1). TTL (Time to Live) value is 64. Return path filtering for all types of network interfaces mentioned in the list is forbidden. This is done by setting the appropriate *rp_filter* item in the proc file system (e.g. *echo 0 > /proc/sys/net/ipv4/conf/eth0/rp_filter*).

  Example:
  eth0 gre1

- **Disable Vifs**
  Corresponds to *-N*, or *–disable-vifs* (see [3]), in the process of runnig aplication (pimd deamon) implementing PIM-SM protocol. If this item is checked, all network interfaces in terms of PIM-SM are inactive and must be enabled selectively (*enable* option of *phyint* command in chapter 2 *Configuration* on page 3). If this item is not checked, then the

19-01-21

situation is reversed and all network interfaces that should not have active PIM-SM protocol (e.g. ppp0) must be explicitly forbidden. Details can be found in the documentation for the pimd deamon (see [3]).

- **Timer Hello Period**
  PIM hello messages are sent periodically on each interface that has PIM enabled in configuration file of pimd deamon (it's possible to define it in *pimd.conf* field). This item specifies period of sending these messages. Default value is 30 seconds.

- **Timer Join/Prune Period**
  Using this item can be specified the time interval at which the router sends the PIM join/prune messages to the upstream RPF (Reverse Path Forwarding) neighbor. The default join/prune message interval is 60 seconds.

- **Timer Bootstrap Period**
  This item specifies period of sending bootstrap messages. Default value is 60 seconds.

- **pimd.conf**
  Configuration file of pimd deamon. Details and examples can be found in the documentation for the pimd deamon.

The changes will apply after pressing the *Apply* button.

www.lucom.de

19-01-21

2. Configuration

The following list mentions commands that can be used when editing pimd.conf file (represented by the same name item in the configuration web interface) and detailed description of these commands.

- **default_source_preference** <preference>
  Preference value is used when forwarder and upstream router is selected for the LAN. Due to the unreliability of obtaining preferences from unicast routing protocols is allowed to enter the default value via this command. It is entered at the beginning of the file. The lower the value, the more likely the router will be selected for above mentioned purposes. But it is not desirable for dedicated applications such as pimd to be selected at the extense of more general application, so it is suitable to set the *perefrence* value somewhat higher (it can be for example 101).

- **default_source_metric** <metric>
  Sets the cost for sending data through this router. The preferred default value is 1024.

- **phyint** <local-addr|ifname> *[disable/enable] [altnet <network> masklen <masklen>] [scoped <network> masklen <masklen>] [threshold thr] [preference pref] [metric cost]*
  Specifies interfaces either by its IP address or name. If you want to activate this interface with default values, you don't need to put anything else. Otherwise enter additional values (detailed description is in the pimd deamon documentation [3]).

- **cand_rp** *[<local-addr>] [priority <number>] [time <number>]*
  Rendezvous point (RP) is the key element in networks with the PIM-SM protocol. This is the point (router) that brings together data from multicast sources and requirements for taking this data from multicast recipients. Rendezvous point in the PIM can be selected statically or dynamically.

  For dynamic selection is used bootstrap machnism. From several candidates for the bootstrap router (CBSR) is selected by simple algorithm one BSR. This router ensures the selection of one RP from set of CRP (Candidate Rendezvous Point). The result should be one RP for the multicast group in the PIM domain.

  If you use *cand_rp* command in pimd.conf file, the corresponding router will become CRP. Parameters are the address of the network interface that is used for reporting parameters of this CRP, priority of CRP (lower number means higher priority) and reporting period.

- **cand_bootstrap_router** *[<local-addr>] [priority <number>]*
  If you use *cand_bootstrap_router* command in pimd.conf file, the corresponding router will become CBSR (see cand_rp description). Parameters of this command are similar to those of *cand_rp* command.

- **rp_address** <rp-addr> *[<group-addr> [masklen <masklen] [priority <number>]]*
  This command is applied when the static method of RP selection is used (see description of *cand_rp*). A required parameter is the IP (unicast) address of RP or a multicast group. Additional parameters can limit the use of RP.

- **group_prefix** <group-addr> *[masklen <masklen>] [priority <number>]*
  This command is applied when the dynamic method of RP selection is used. Specifies the multicast group for which the router acts as a RP in case that this router is selected from the set of CRPs. The maximum number of these specifications in the pimd.conf file is 255.

- **switch_data_threshold** *[rate <number> interval <number>]*
  PIM-SM protocol uses several ways to transfer packets with multicast addresses between sources (transmitters) and recipients (receivers). For each of these ways is a characteristic logical network topology. This topology is established by reports that are sent between PIM-SM routers.

  Each of these topologies – tree structures – has its name. There are also RP tree (RPT) that is the same as the shared tree. Another option is source-specific tree and finally there is source-specific shortest-path tree.

  These types of tree structures are lised in the order in which it increases overhead required for their assembly and maintenance. Likewise in most cases also increases its transmission capacity.

  The *switch_data_threshold* command sets a limit for the transition to a logical topology with higher throughput.

- **switch_register_threshold** *[rate <number> interval <number>]*
  Opposite to the previous command.

2.1   Configuration example – Static selection of RP

Below is an example of configuring with a static selection of RP (Rendezvous Point). Configuration is entered into the *pimd.conf* field in web interface of this user module.

```
default_source_preference 101

phyint eth1 enable
phyint gre1 enable preference 102
rp_address 10.168.254.1
switch_data_threshold rate 60000 interval 10
switch_register_treshold rate 60000 interval 10
```

www.lucom.de

19-01-21

Figure 1: Static selection of RP

2.2 Configuration example – Dynamic selection of RP

Below is an example of configuring with a dynamic selection of RP (Rendezvous Point). Configuration is entered into the *pimd.conf* field in web interface of this user module.

```
default_source_preference 101

phyint eth1 enable
phyint gre1 enable preference 102
cand_rp 10.168.254.1 priority 10
cand_bootstrap_router 10.168.254.1 priority 10
group_prefix 239.0.0.0 masklen 8 priority 10
switch_data_threshold rate 60000 interval 10
switch_register_treshold rate 60000 interval 10
```

www.lucom.de

19-01-21

Figure 2: Dynamic selection of RP

2.3 System Log

In case of any problems it is possible to view the system log by pressing the *System Log* menu item. In the window are displayed detailed reports from individual applications running in the router including possible reports relating to the *PIM SM* module.

6

3. Interoperability

Pimd is able to work with other software products that meet the specification of PIM-SM protocol. The exceptions are some older versions of IOS (Cisco) that do not meet this specification at one point. More specifically, the issue is the calculation of the checksum of PIM_REGISTER messages. In newer vesions of IOS this problem is already resolved.

4. Related Documents

[1]   Advantech Czech: **v2 Routers Configuration Manual** (MAN-0021-EN)
[2]   Advantech Czech: **SmartFlex Configuration Manual** (MAN-0023-EN)
[3]   Advantech Czech: **SmartMotion Configuration Manual** (MAN-0024-EN)
[4]   Advantech Czech: **SmartStart Configuration Manual** (MAN-0022-EN)
[5]   Advantech Czech: **ICR-3200 Configuration Manual** (MAN-0042-EN)
[6]   Internet: manpages.ubuntu.com/manpages/maverick/man8/pimd.8.html

Product related documents can be obtained on *Engineering Portal* at   www.ep.advantech-bb.cz address.

www.lucom.de

8

19-01-21