Agenda

- Introduction
- Scope of current model
- Current progress
- Unresolved issues
- Model structures
- Discussion
Introduction

- Drafts like this are under discussion by the YANG multicast design team
- Join us!
- Wiki: http://trac.tools.ietf.org/wg/pim/trac/wiki/yang
- This draft is versioned on github: https://github.com/mcallisterjp/pim-yang/
PIM Model Scope and Overview

• Will cover all core PIM and PIM protocol extensions
• Other multicast protocols will be covered by different drafts
  • Proposed YANG modules:
    ietf-pim-base.yang
      +- ietf-pim-rp.yang
      +- ietf-pim-sm.yang
      +- ietf-pim-dm.yang
      +- ietf-pim-bidir.yang
Current Progress

• Agreed on interface hierarchy
• Agreed on RP model structure
• Modeled configuration parameters
• Modeled state parameters
• Added notifications

• To do:
  • Constraints
  • Policy
Unresolved Issues

• Group range mappings
  • It is desirable to index on group range
  • Group range may be specified as arbitrary policy structures
• Some questions dependent on other groups:
  • How to configure BFD
  • How to express the general concept underlying ACL/policy
Interface Hierarchy

+--rw pim
  +--rw interfaces
    +--rw interface* [interface]
      +--rw interface          if:interface-ref
    +--rw address-family* [address-family]
      +--rw address-family     identityref
      +--rw dr-priority?        uint32 {intf-dr-priority}?
      +--rw hello-interval?     uint16 {intf-hello-interval}?
      +--rw (hello-holdtime-or-multipler)?
        |  +--:(holdtime) {intf-hello-holdtime}?
        |  |  +--rw hello-holdtime?    uint16
        |  +--:(multipler) {intf-hello-multipler}?
        |     +--rw hello-multipler?  uint8
      +--rw jp-interval?        uint16 {intf-jp-interval}?
      +--rw (jp-holdtime-or-multipler)?
        |  +--:(holdtime) {intf-jp-holdtime}?
        |  |  +--rw jp-holdtime?       uint16
        |  +--:(multipler) {intf-jp-multipler}?
        |     +--rw jp-multipler?     uint8
      +--rw propagation-delay?   uint16 {intf-propagation-delay}?
      +--rw override-interval?   uint16 {intf-override-interval}?
Interface Augmentations for SM, DM, and BIDIR Modes

```markdown
+--rw pim
  +--rw interfaces
    +--rw interface* [interface]
      +--rw interface if:interface-ref
    +--rw address-family* [address-family]
      +--rw address-family identityref
    ...
  +--rw pim-bidir:bidir!
  |   +--rw pim-bidir:df-election {intf-df-election}?
  |   |   +--rw pim-bidir:offer-interval? uint32
  |   |   +--rw pim-bidir:backoff-interval? uint32
  |   |   +--rw pim-bidir:offer-multipler? uint8
  +--rw pim-dm:dm!
  +--rw pim-sm:sm!
    +--rw pim-sm:passive? Empty
```
module: ietf-pim-base
augment /rt:routing/rt:routing-instance/rt:routing-protocols:
  +--rw pim
    +--rw graceful-restart
      |  +--rw enabled?    boolean
      |  +--rw duration?   uint16
    +--rw address-family* [address-family]
      |  +--rw address-family      identityref
      |  +--rw graceful-restart
      |     |  +--rw enabled?    boolean
      |     |  +--rw duration?   uint16
Current Static RP Configuration

module: ietf-pim-base
augment /rt:routing/rt:routing-instance/rt:routing-protocols:
  +--rw pim
    +--rw address-family* [address-family]
      |  +--rw pim-rp:rp
      |     +--rw pim-rp:static-rp
      |     |  +--rw pim-rp:ipv4-rp* [ipv4-addr]
      |     |     +--rw pim-rp:ipv4-addr inet:ipv4-address
      |     |     +--rw pim-bidir:bidir!
      |     |     |  +--rw pim-bidir:policy-name? string
      |     |     |  +--rw pim-bidir:override? boolean {static-rp-override}?
      |     +--rw pim-sm:sm!
      |        +--rw pim-sm:policy-name? string
      |        +--rw pim-sm:override? boolean {static-rp-override}?
      +--rw pim-rp:ipv6-rp* [ipv6-addr]
      |  +--rw pim-rp:ipv6-addr inet:ipv6-address
      |  +--rw pim-bidir:bidir!
      |  |  +--rw pim-bidir:policy-name? string
      |  |  +--rw pim-bidir:override? boolean {static-rp-override}?
      +--rw pim-sm:sm!
        +--rw pim-sm:policy-name? string
        +--rw pim-sm:override? boolean {static-rp-override}?
Current BSR Configuration

augment /rt:routing/rt:routing-instance/rt:routing-protocols:
  +--rw pim
  |   +--rw address-family* [address-family]
  |     |   +--rw pim-rp:rp
  |     |     |   +--rw pim-rp:bsr {bsr}?
  |     |     |     |   +--rw pim-rp:bsr-candidate!
  |     |     |     |     |   +--rw (interface-or-address)?
  |     |     |     |     |     |   +--:(interface) {candidate-interface}?
  |     |     |     |     |     |     |   |   |   +--rw pim-rp:interface if:interface-ref
  |     |     |     |     |     |     |   |   |   +--:(ipv4-address) {candidate-ipv4}?
  |     |     |     |     |     |     |   |   |     |   +--rw pim-rp:ipv4-address inet:ipv4-address
  |     |     |     |     |     |     |   |   |     |     |   +--:(ipv6-address) {candidate-ipv6}?
  |     |     |     |     |     |     |   |   |     |     |     |   +--rw pim-rp:ipv6-address inet:ipv6-address
  |     |     |     |     |     |     |     |   +--rw pim-rp:hash-mask-length uint8
  |     |     |     |     |     |     |     |     |   +--rw pim-rp:pim-candidate-interface* [interface] {candidate-interface}?
  |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:interface if:interface-ref
  |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:policy? string
  |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:mode? identityref
  |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:candidate-ipv4-address* [ipv4-address] {candidate-ipv4}?
  |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:ipv4-address inet:ipv4-address
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:policy? string
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:mode? identityref
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:candidate-ipv6-address* [ipv6-address] {candidate-ipv6}?
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:ipv6-address inet:ipv6-address
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:policy? string
  |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |   +--rw pim-rp:mode? identityref

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SM Augmentation to PIM Base

augment /rt:routing/rt:routing-instance/rt:routing-protocols:
  +--rw pim
  |   +--rw address-family* [address-family]
  |       |   +--rw pim-sm:sm
  |       |       +--rw pim-sm:asm
  |       |       |   +--rw pim-sm:anycast-rp!
  |       |       |       +--rw pim-sm:ipv4
  |       |       |       |   +--rw pim-sm:ipv4-anycast-rp* [anycast-addr rp-addr]
  |       |       |       |       +--rw pim-sm:anycast-addr inet:ipv4-address
  |       |       |       |       +--rw pim-sm:rp-addr inet:ipv4-address
  |       |       |       +--rw pim-sm:ipv6
  |       |       |       |   +--rw pim-sm:ipv6-anycast-rip* [anycast-addr rp-addr]
  |       |       |       |       +--rw pim-sm:anycast-addr inet:ipv6-address
  |       |       |       |       +--rw pim-sm:rp-addr inet:ipv6-address
  |       |       +--rw pim-sm:spt-switch
  |       |       |   +--rw pim-sm:infinity! {spt-switch-infinity}?
  |       |       |       +--rw pim-sm:policy-name? string {spt-switch-policy}?
  |       +--rw pim-sm:ssm!
  |           +--rw pim-sm:range-poligy? string
Interface State

augment /rt:routing-state/rt:routing-instance/rt:routing-protocols:
  +--ro pim
    +--ro interfaces
      +--ro interface* [interface]
        +--ro address-family* [address-family]
          +--ro address-family identityref
            ...
          +--ro oper-status? enumeration
          +--ro hello-expire? uint32
          +--ro neighbor-ipv4* [address]
            |   +--ro address inet:ipv4-address
            |   +--ro bfd-status? enumeration
            |   +--ro expire? uint32
            |   +--ro dr-priority? uint32
            |   +--ro gen-id? uint32
            |   +--ro up-time? uint32
          +--ro neighbor-ipv6* [address]
            +--ro address inet:ipv6-address
            +--ro bfd-status? enumeration
            +--ro expire? uint32
            +--ro dr-priority? uint32
            +--ro gen-id? uint32
            +--ro up-time? uint32
Statistics

augment /rt:routing-state/rt:routing-instance/rt:routing-protocols:
  +--ro pim
    +--ro address-family* [address-family]
      |   +--ro statistics
      |   |   +--ro discontinuity-time? yang:date-and-time
      |   |   +--ro error
      |   |   |   +--ro assert? yang:counter32
      |   |   |   +--ro bsr? yang:counter32
      |   |   |   +--ro candidate-rp-advertisement? yang:counter32
      |   |   |   +--ro hello? yang:counter32
      |   |   |   +--ro join-prune? yang:counter32
      |   |   |   +--ro register? yang:counter32
      |   |   |   +--ro register-stop? yang:counter32
      |   |   |   +--ro state-refresh? yang:counter32
      |   +--ro queue
      |   |   +--ro size? uint32
      |   |   +--ro overflow? yang:counter32
      +--ro received
      |   +--ro assert? yang:counter32
      |   +--ro bsr? yang:counter32
      |   +--ro candidate-rp-advertisement? yang:counter32
      |   +--ro hello? yang:counter32
      |   +--ro join-prune? yang:counter32
      |   +--ro register? yang:counter32
      |   +--ro register-stop? yang:counter32
      |   +--ro state-refresh? yang:counter32
      |   +--ro sent

... ...

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augment /rt:routing-state/rt:routing-instance/rt:routing-protocols:
  +--ro pim
   +--ro address-family* [address-family]
     |   +--ro topology-tree-info
     |   |   +--ro ipv4-route* [group source-addr is-rpt]
     |   |   |   +--ro group inet:ipv4-address
     |   |   |   +--ro source-addr union
     |   |   |   +--ro is-rpt boolean
     |   |   |   +--ro expire? uint32
     |   |   |   +--ro incoming-interface? if:interface-ref
     |   |   |   +--ro mode? pim-mode
     |   |   |   +--ro msdp-learned? boolean
     |   |   |   +--ro rp-address? inet:ip-address
     |   |   |   +--ro rpf-neighbor? inet:ip-address
     |   |   |   +--ro spt-bit? boolean
     |   |   |   +--ro up-time? uint32
     |   |   |   +--ro outgoing-interface* [name]
     |   |   |   |   +--ro name if:interface-ref
     |   |   |   |   +--ro expire? yang:timeticks
     |   |   |   |   +--ro up-time? yang:timeticks
     |   |   |   |   +--ro jp-state? enumeration
     |   |   |   +--ro ipv6-route* [group source-addr is-rpt]
     |   |   ...
BSR and RP Election States

augment /rt:routing-state/rt:routing-instance/rt:routing-protocols:
  +--ro pim
    +--ro address-family* [address-family]
      |  +--ro pim-rp:rp
      |  |  +--ro pim-rp:bsr {bsr}?
      |  |  |  +--ro pim-rp:bsr
      |  |  |  |  +--ro pim-rp:addr? inet:ip-address
      |  |  |  |  +--ro pim-rp:hash-mask-length? uint8
      |  |  |  |  +--ro pim-rp:priority? uint8
      |  |  |  |  +--ro pim-rp:up-time? uint32
      |  |  |  +--ro (election-state)? {bsr-election-state}?
      |  |  |  |  +--:(candidate)
      |  |  |  |  |  +--ro pim-rp:candidate-bsr-state? enumeration
      |  |  |  |  |  +--:(non-candidate)
      |  |  |  |  |  +--ro pim-rp:non-candidate-bsr-state? enumeration
      |  |  |  |  +--ro pim-rp:bsr-next-bootstrap? uint16
      |  |  |  +--ro pim-rp:rp
      |  |  |  |  +--ro pim-rp:rp-address? inet:ip-address
      |  |  |  |  +--ro pim-rp:group-policy? string
      |  |  |  |  +--ro pim-rp:up-time? uint32
      |  |  |  +--ro pim-rp:rp-candidate-next-advertisement? Uint16
RP States

augment /rt:routing-state/rt:routing-instance/rt:routing-protocols:
  +--ro pim
    +--ro address-family* [address-family]
      |  +--ro pim-rp:rp
      |  |  +--ro pim-rp:rp-list
      |  |  |  +--ro pim-rp:ipv4-rp* [ipv4-addr]
      |  |  |  |  +--ro pim-rp:ipv4-addr           inet:ipv4-address
      |  |  |  |  +--ro pim-rp:info-source-addr?   inet:ipv4-address
      |  |  |  |  +--ro pim-rp:info-source-type?   enumeration
      |  |  |  |  +--ro pim-rp:up-time?            uint32
      |  |  |  |  +--ro pim-rp:expire?             uint16
      |  |  |  +--ro pim-rp:ipv6-rp* [ipv6-addr]
      |  |  +--ro pim-rp:rp-mappings
      |  |  |  +--ro pim-rp:ipv4-rp* [group rp-addr]
      |  |  |  |  +--ro pim-rp:group               inet:ipv4-prefix
      |  |  |  |  +--ro pim-rp:rp-addr             inet:ipv4-address
      |  |  |  |  +--ro pim-rp:info-source-addr?   inet:ipv4-address
      |  |  |  |  +--ro pim-rp:info-source-type?   enumeration
      |  |  |  |  +--ro pim-rp:up-time?            uint32
      |  |  |  |  +--ro pim-rp:expire?             uint16
      |  |  |  +--ro pim-rp:ipv6-rp* [group rp-addr]
      |  ...
Interface and Neighbor Notifications

notifications:

--- n pim-neighbor-event
  |  --- ro event-type?  neighbor-event-type
  |  --- ro interface-state-ref?  leafref
  |  --- ro interface-af-state-ref?  leafref
  |  --- ro neighbor-ipv4-state-ref?  leafref
  |  --- ro neighbor-ipv6-state-ref?  leafref
  |  --- ro up-time?  uint32

--- n pim-interface-event
  |  --- ro event-type?  interface-event-type
  |  --- ro interface-state-ref?  leafref
  |  --- ro ipv4
    |  |  --- ro address*  inet:ipv4-address
    |  |  --- ro dr-addr?  inet:ipv4-address
  |  --- ro ipv6
    |  |  --- ro address*  inet:ipv6-address
    |  |  --- ro dr-addr?  inet:ipv6-address
RP Notifications

notifications:
  +----n pim-rp-event
    +---ro event-type?             rp-event-type
    +---ro routing-instance-state-ref? rt:routing-instance-state-ref
    +---ro instance-af-state-ref?   leafref
    +---ro group?                   inet:ip-address
    +---ro rp-address?              inet:ip-address
    +---ro is-rpt?                  boolean
    +---ro mode?                    pim-base:pim-mode
    +---ro message-origin?          inet:ip-address
Discussion

Questions?