YANG based Config for MAC Privacy 802.1AEdk

Don Fedyk (dfedyk@labn.net)
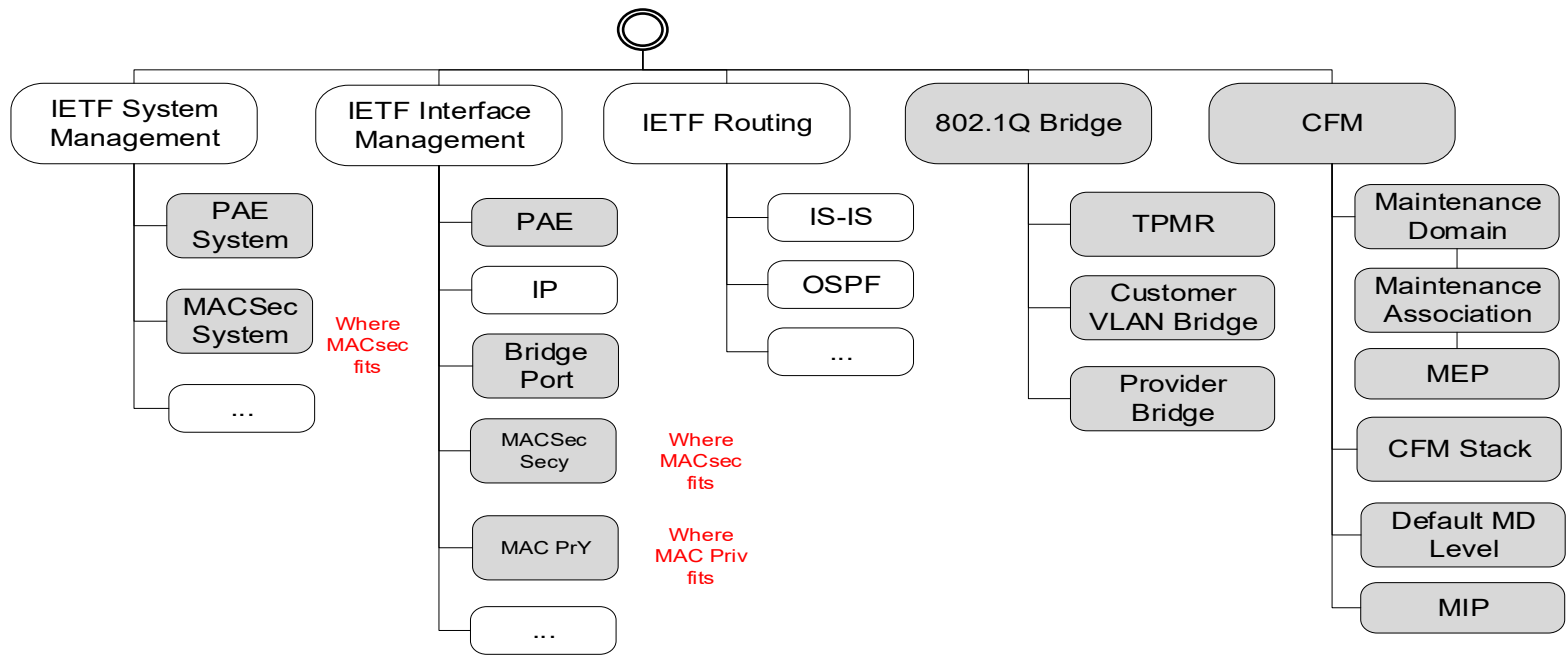
Outline

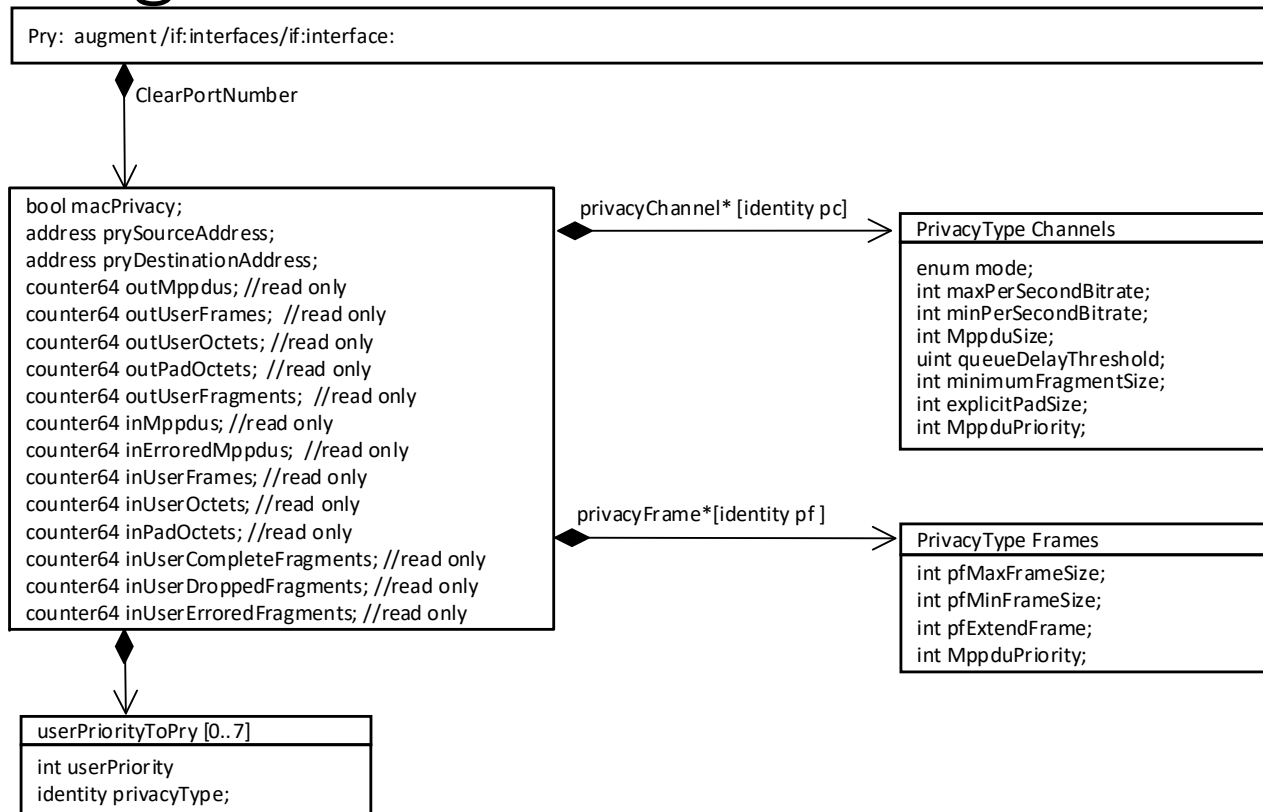- Proto Config for MAC Privacy

Forward

- This presentation is for a discussion on detailed config.
- It may contain errors/omission and should be consider a work in progress.
- An updated version the presentation will be posted after discussion to correct it but it will remain a work in progress.

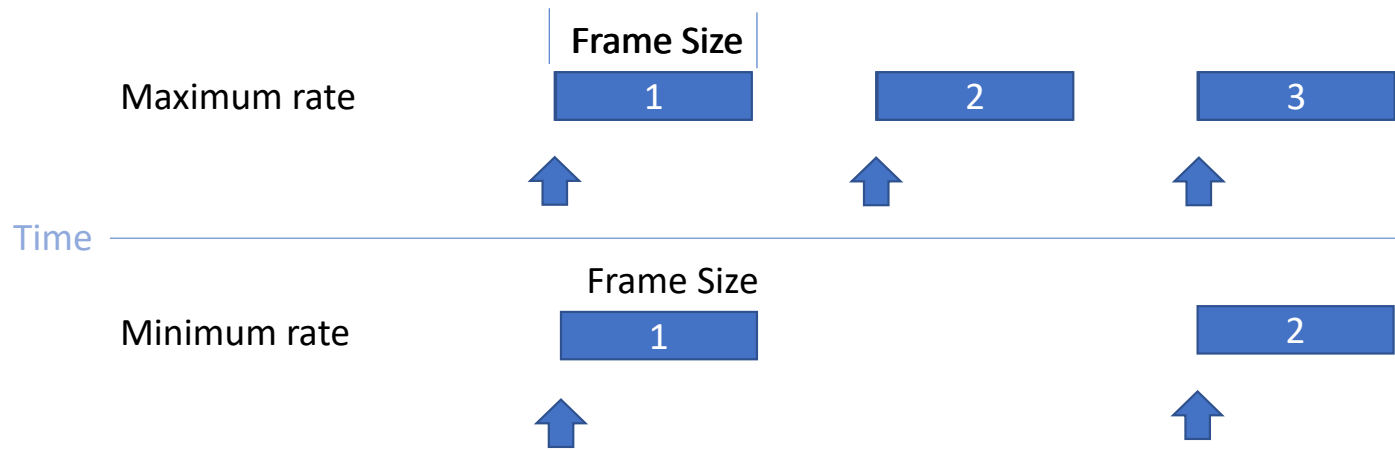# Instance Diagram for MACSec and MAC Privacy

UML Diagram

Pry: augment /if:interfaces/if:interface:

ClearPortNumber

bool macPrivacy;
address prySourceAddress;
address pryDestinationAddress;
counter64 outMppdus; //read only
counter64 outUserFrames; //read only
counter64 outUserOctets; //read only
counter64 outPadOctets; //read only
counter64 outUserFragments; //read only
counter64 inMppdus; //read only
counter64 inErroredMppdus; //read only
counter64 inUserFrames; //read only
counter64 inUserOctets; //read only
counter64 inPadOctets; //read only
counter64 inUserCompleteFragments; //read only
counter64 inUserDroppedFragments; //read only
counter64 inUserErroredFragments; //read only

privacyChannel* [identity pc]

PrivacyType Channels

enum mode;
int maxPerSecondBitrate;
int minPerSecondBitrate;
int MppduSize;
uint queueDelayThreshold;
int minimumFragmentSize;
int explicitPadSize;
int MppduPriority;

privacyFrame*[identity pf]

PrivacyType Frames

int pfMaxFrameSize;
int pfMinFrameSize;
int pfExtendFrame;
int MppduPriority;

userPriorityToPry [0..7]

int userPriority
identity privacyType;

Privacy Channel Config

- Two Identity types
  - Channel
  - Channel-express
- Two Modes either:
  - fixed-size-minimum-rate or,
  - fixed-size-maximum-rate
- MPPDU frame size
- Map Priorities to Channels
- MaxPerSecondBitrate
- MinPerSecondBitrate
- queueDelayThreshold
- Explicit Pad size
- MPPDU priority (DE set to 0)

Privacy Channel Timing

Frame Size

Maximum rate

| 1 | 2 | 3 |

Time →

Frame Size

Minimum rate

| 1 | 2 |

Interval = Frame Size –bits / rate bits/secs
Rate <= link rate

Use case Fixed size Minimum Rate

If the queue builds up to a threshold change to the maximum rate.
Queue size translates to a time by buffered bits/minimum rate.
So specify this as queueDelayThreshold(other names?)

An operator can use buffer size/minimum rate to compute the queueDelayThreshold time value.
Implementation can use a buffer threshold or time computation.

Minimum Fragment Size

- Size of a minimum fragment.
- Enables control of preemption of fragments
- Size of 0 means only fragment when fragment will not fit in frame.
- (Mapping to express control whether or not preemption is used).

Explicit Pad size

- Allows addition of user frames while a MPPDU has started transmitting but has padding.

- Value of zero means not explicit pads.

- Need recomneastions for nominal sizes.

Privacy Frame Config

- MaxFrameSize;
  - Cannot accept frames larger than this (is overhead included)

- MinFrameSize;
  - Pad frames to at least this size

- ExtendFrame;
  - Pad Frames by some byte boundary eg nearest 16 byte boundary, 32 byte boundary etc. Frames will appear in only fixed sizes.

- MppduPriority
  - DE can be transparently passed through unless multiple user frames are included in the MPPDU

Priority Mapping

Priority (low-high)	Identity Map Union of channel and frame identities
0	channel
1	channel
2	channel
3	channel-express
4	channel-express
5	frame-b
6	frame-b
7	frame-a

identity channel-ident
  identity channel-express
  identity channel
identity frame-ident
  identity frame-a
  identity frame-b
  identity frame-c
  identity frame-d
  identity frame-e
  identity frame-f
  identity frame-g
  identity frame-h

Minor issue that Frames or channels can be defined that are not used. Creates

Prioritieof channels and frames are mapped to channels and frames Orthogonal to names.

Statistics

```
+--ro out-mppdus?                    yang:counter64
+--ro out-user-frames?               yang:counter64
+--ro out-user-octets?               yang:counter64
+--ro out-pad-octets?                yang:counter64
+--ro out-user-fragments?            yang:counter64
+--ro in-mppdus?                     yang:counter64
+--ro in-errored-mppdus?             yang:counter64
+--ro in-user-frames?                yang:counter64
+--ro in-errored-user-frames?        yang:counter64
+--ro in-user-octets?                yang:counter64
+--ro in-pad-octets?                 yang:counter64
+--ro in-user-fragments?             yang:counter64
+--ro in-user-dropped-fragments?     yang:counter64
+--ro in-user-errored-fragments?     yang:counter64
```

Other?

- Is there any other config?

Output from the Prototype

```
pry {
     mac-privacy enabled
     pry-source-address 00-00-00-11-11-11
     pry-destination-address 00-00-00-11-11-22
     user-priority-to-pry 0 {
       user-priority 0
       privacy-type channel
     }
     user-priority-to-pry 1 {
       user-priority 1
       privacy-type channel
     }
     user-priority-to-pry 2 {
       user-priority 2
       privacy-type channel
     }
     user-priority-to-pry 3 {
       user-priority 3
       privacy-type channel
     }
     user-priority-to-pry 4 {
       user-priority 4
       privacy-type channel-express
     }
     user-priority-to-pry 5 {
       user-priority 5
       privacy-type channel-express
     }
     user-priority-to-pry 6 {
       user-priority 6
       privacy-type frame-a
     }
     user-priority-to-pry 7 {
       user-priority 7
       privacy-type frame-a
     }
```

```
     privacy-channel dot1ae-pry:channel-express {
       pc dot1ae-pry:channel-express
       mode fixed-size-minimum-rate
       max-per-second-bitrate 10000
       max-per-second-bitrate 1000000
       mppdu-size 4096
       queue-delay-threshold 1000
       minimum-fragment-size 1000
       explicit_pad_size 1000
       mppdu-priority 4
     }
     privacy-frame dot1ae-pry:frame-a {
       pf dot1ae-pry:frame-a
       pf-max-frame-size 4096
       pf-min-frame-size 300
       pf-extend-frame 64
       mppdu-priority 6
     }
}
```