Comment: this text would belong under the Clause that defines the header format.

## RoE encapsulation common frame format

Tbd.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 3 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 |
| ver | pkt\_type | r | flow\_id | t | timestamp or seqnum |
|  | ..payload.. |

Figure : RoE common header fields

### ver (version) field

The ver field indicates the RoE header version. This specificatation defines the version 0 (0b00) of the header as shown in Figure 1. Other version values are reserved.

Editor’s Note: should state here that future specifications may define new versions of the header and nothing except the version field is fixed. However, radical changes to the header should be avoided.

### pkt\_type (packet type) field

The pkt\_type field contains information of the RoE packet subtype. The pkt\_type 0x00 is reserved for RoE protocol control packets.

### r (reserved) field

The r field is reserved in the version 0 of the protocol. The field must be set to 0b00 when sending and ignored on reception.

Discussion: need to mark the start of the “frame” e.g. where the CPRI hyperframe starts. And how to handle K-characters for example.

### flow\_id (flow identifier) field

The flow\_id contains the RoE packet flow identifier number. The flow identifier represented as unsigned integer between 0x0 and 0x7f.

Note: forward look into M-MIMO that does ~100 antennas

Justify the size and document ways to “extend” flow\_ids when they are used up (e.g. add a new MAC address).

The field is used for multiplexing purposes between two RoE endpoints. The flow identifier allows decoupling RoE flow multiplexing from underlying network provided multiplying mechanisms.

### t-flag (timestamp enabled) field

The t-flag is used to indicate whether the following 31 bits are interpreted as a timestamp or as a sequence number.

When the t-flag=0b0 then the following 31 bits are interpreted as a RoE packet *sequence number*.

When the t-flag=0b1 then the following 31 bits are interpreted as a *timestamp*.

### Timestamp and sequence number fields

Tbd.

#### timestamp

The timestamp field is actually a 31 bit presentation time of the packet at the receiver. The use of timestamp de-couples RoE flow play-out time from network transit time

The reference time is defined to be the International Atomic Time (TAI). The timestamp is in nanoseconds and allows expressing a presentation time 2 seconds to the future.

The timestamp in the RoE header is formed as follows. The actual system time, is for example, taken from the 1588 time. The example below assume 1588 time:

1588\_time = 1588\_current\_time + constant\_latency\_time + dejitter\_time;

timestamp = 1588\_time.nanosecondsField & 0x3fffffff | (1588\_time.secondsField & 1) << 30;

The constant latency time represents the oneway network delay and the required de-jitter delay at the receiver. How the delay is actually measured is outside of scope of this specification.

Discussion about whether we need presentation time or just a timestamp on the ingress.

Discussion of the size of the timestamp.

Discussion on the granularity i.e. whether 1ns is enough.

Tbd.

#### seqnum

The seqnum is a 31 bits packet sequence number field. The sequence number counter is increased by one on every sent packet, also when the t-flag=0b1and the 31 bits field actually carries a timestamp. The seqnum is initialized to 0. This field is to wrap from 0b1111111111111111111111111111111 to 0b0000000000000000000000000000000 (0x7F-FF-FF-FF to 0x00-00-00-00).

Should be per pkt\_type.

Discussion whether seqnums are needed at all.. i.e. can everything be done with timestamps.

Discussion whether control packets could actually carry the seqnum to ToC mapping. Then one would be fine with seqnums only in the RoE header.

### Payload

The payload field content is dependant on the RoE packet subtype.

## Allocated pkt\_type values

Tbd.

Table : RoE packet pkt\_type values

|  |  |  |
| --- | --- | --- |
| pkt\_type in hexadecimal | Function | Meaning |
| 0x00 | Control packet | The payload carries TLVs for control purposes. N |
| 0x01 | Structure agnostic packet | The content of the payload is unknown at the RoE protocol level. Only the application at using the RoE transport know interpret the payload content. |
| 0x02 | Antenna flow | tbd. |
| 0x03 | Vendor specific flow | tbd. |
| 0x04 | Antenna control  | tbd. |
| 0x05 | Slow C&M | tbd. |

Others