Radio over Ethernet Considerations

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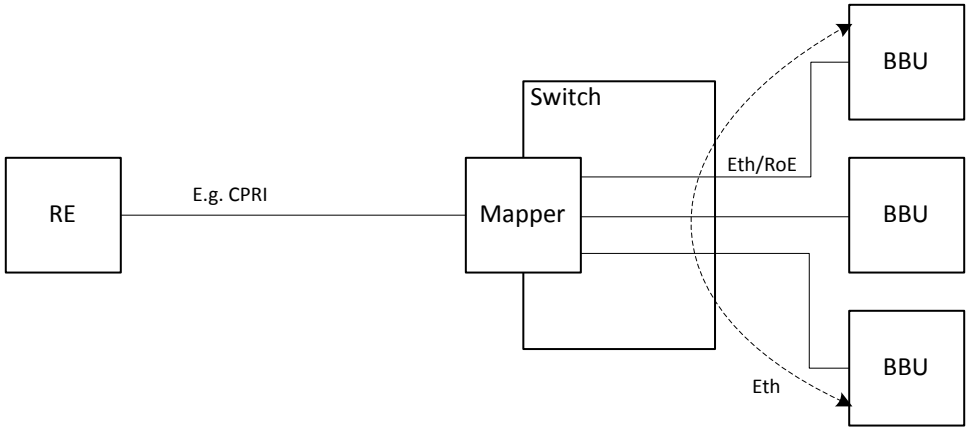
RoE Considerations

- Use cases:
  - Aggregation
  - Native RoE
- Two modes to support:
  - Structure agnostic -> encapsulate an opaque data blob and transport it.
  - Structure aware -> know the type of the transported stream/flow.
- Mappers:
  - How does e.g. CPRI (up to v6.1) map to RoE structure aware mode?

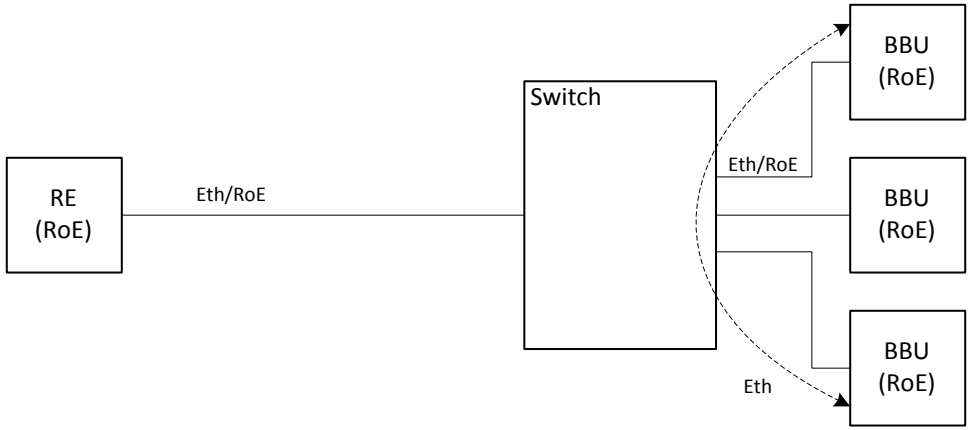
Use case examples

Use cases

- Hybrid
  - Legacy format converted to RoE within the system
  - Requires a mapper

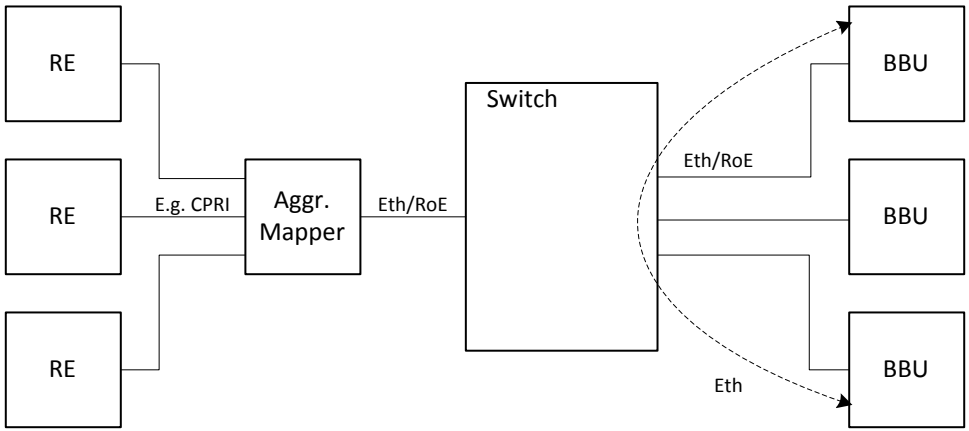


- Native RoE e2e
  - No mapping
  - System supports RoE in all parts



Use cases cont'd..

- Aggregation
  - Requires only one mapper on radio side
  - System + transport support RoE



Design decisions to discuss

Encapsulation modes

- Two choices..
  - Structure agnostic
  - Structure aware

- Nevertheless.. the encapsulation header should be the same for both modes..

Design choices to discuss

- Native RoE Encapsulation format
  - Minimal header -> 32 bits base header should be enough per packet.
  - Number of “basic frames” per Ethernet packet -> small Ethernet packets -> large overhead.
  - Number of supported antenna carriers per system.
  - Number of antenna carriers per RoE packet. (thinking: switching becomes hard if more than once carrier per packet..)
  - Size of a “basic frame”.

Design choices to discuss cont'd

- Division of information in the RoE Header vs. Ethernet Header vs. OOB negotiation:
  - How much can be assumed to be negotiated between the RE and REC out-of-band (OOB)? It makes no sense to transport static fields all the time.
  - What information MUST be in every RoE packet header..?
- Link configuration management:
  - What protocol / configuration could be used for "OOB negotiation"? How is this handled/managed?
  - What information can be assumed to be derived from EthType/MAC addresses/TAG/VLANID etc ?
  - Sample size negotiation? Other than radio sample flow negotiation?
  - Done when? Possibly during the link setup/sync phase..?

Transport overhead

- Ethernet packets:
  - What is included? Also TPID+TCI all the time (VLANs, PCP, ..)?
- RoE encapsulation format:
  - 32 bits base header per Ethernet packet. Assume that in come cases the header may grow..
- Timing & Sync:
  - Count for 1588 packets sent over the same transport as the RoE traffic.
- Number of flows:
  - RoE flows, C&M flows, Vendor specific flows.
  - All they contribute to the total overhead…

Transport assumptions

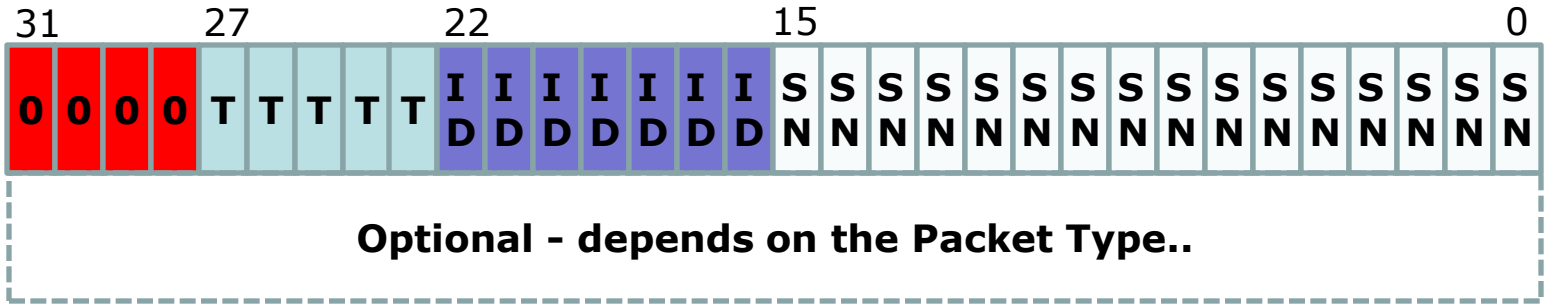
- How much can be squeezed into 2.5/5/10/25/../100Gbps Ethernet links?
- Which flows are time-sensitive and which not?
- What are required from the transport / switching to ensure timely delivery of RoE packets?
  - What 802.1 tools we got to enforce this?

The RoE Header / Encapsulation

On the RoE Header

- Assumptions..
  - Minimal size. Proposal for 32 bits for the base.
  - Should be usable outside Ethernet as well.. Verify whether the header would be usable as-is with other transports as well.
  - Identify MUST HAVE information in the header.
  - How is the payload content length calculated (example: basic frame size is known priori, header size is fixed, and the Ethernet packet size is learned during reception)?
  - Same header used for both structure agonistic and aware modes.

Strawman proposal: the RoE Header

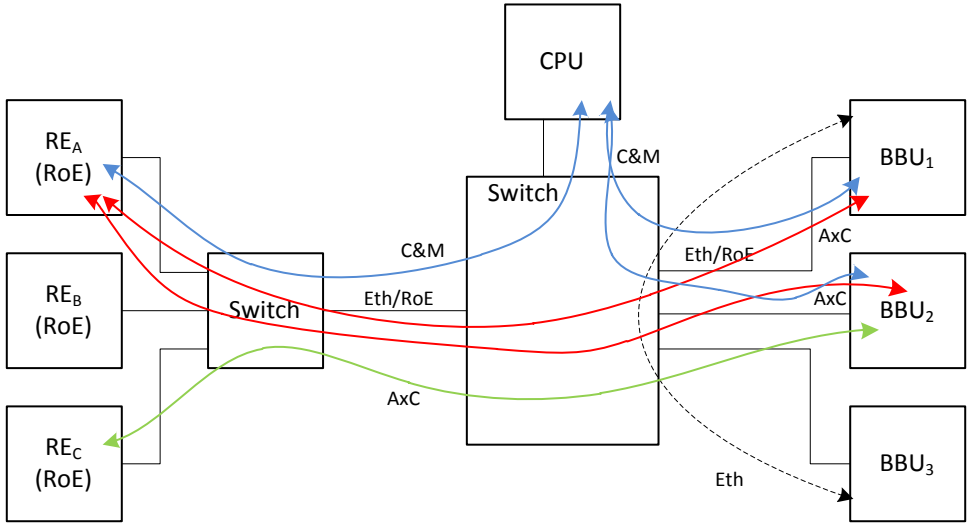


- Bits 31-28 -> set all 0.
- Bits 27-23 -> Packet Type; 32 types available.
  - One value reserved for Structure Agnostic payload.
  - One value reserved for future extensions.
  - Some types may include additional headers.
- Bits 22-16 -> Flow ID; 128 available.
- Bits 15-0 -> Sequence Number.
  - How the SN is actually constructed??
- Btw.. The above suddenly resembles PWE CW..

Strawman proposal: the flows

- The RoE does not really need to understand the data it carries beyond the type and time sensitiveness.

- Each flow in separate RoE packet:
  - Easier (and more compact) to construct.
  - Each flow can be switched individually!



The mapper

Mappers and their restrictions

- Example of a CPRI (v6.1) mapper to the native RoE format:
  - 1:1 translation is challenging.
  - Not all information in the CPRI Hyper Frame and Basic Frame is needed…?
  - Which information of CPRI framing is MUST to translate back and forth to RoE?

Strawman proposal: Mapper

- Radio flows:
  - I/Q data.. Any sample size etc..
- C&M flows:
  - Fast C&M is Ethernet already..
- What about ctrl_AxC data?
  - Opaque data flows to mapper..
- What about vendor specific flows?
  - Opaque data flows to mapper..
- And then L1 protocol..?
  - Terminated locally?

Q & A