Control Hierarchy

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Introduction

- This proposal proposes
  - Parameter structure
  - Parameter priorities
  - Some (mostly agreed) parameters themselves
- No attempt to describe *how* the parameters are exchanged is attempted here.
- Focused on data packets
- Suggest using flowID instead of flow_id
  - For consistency (remove any/all _)

Resource Elements

- A given RoE implementation has a certain number of physical blocks
  - A certain number of Ethernet SA/DA pairs
  - A certain number of CPRI ports (0 for native)
  - A certain number of mappers
    - With a certain number of containers (for structure aware)
- It also has some wiring
  - Flows describe (aka segments) how a mapper output is connected to a particular Ethernet SA/DA pair. And when the block is ready (time and size)

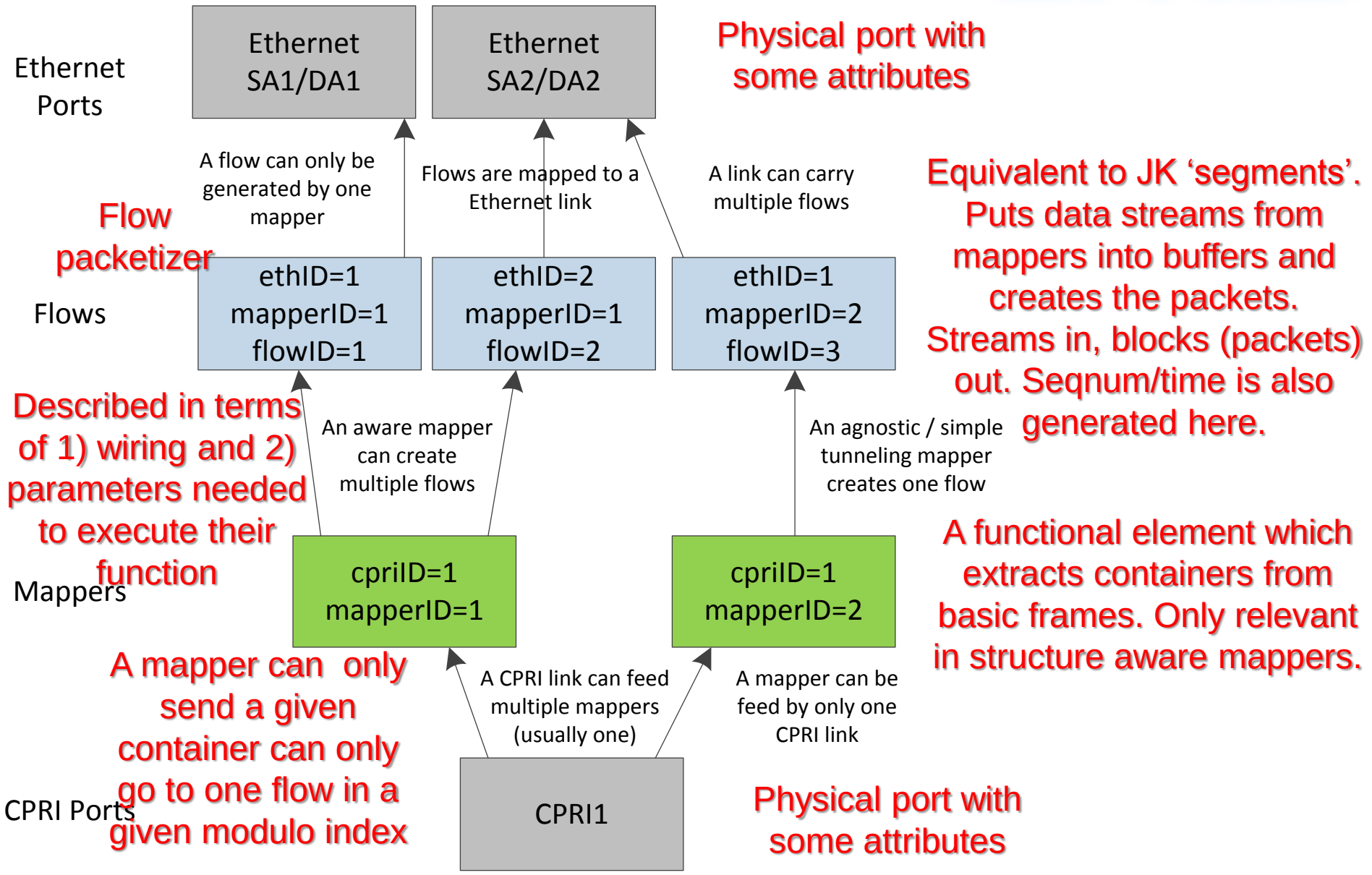
Hierarchy Overview

- Ethernet **Link**
  - Physical RoE connection with logical connections
  - A link uses a single SA and DA pair
  - A link can carry multiple flows
- **Mapper** & its Parameters
  - A mapper may support multiple flows
  - A mapper is associated with a single CPRI link
  - Each mapper works with a single sense of time
  - A mapper has information about **containers**
- **Flow** & its Parameters
  - Each Flow ∈ Mapper and ∈ Ethernet Link
  - A flow is essentially a way of using the same SA/DA for multiple streams of data
  - A flow can only be associated with a single mapper
  - A flow shall be unidirectional
  - Each flow has ~~may have~~ a unique sequence number

Parameters are associated with HW elements

Described in terms of 1) wiring and 2) parameters needed to execute their function. (?)

Example


Ethernet Ports
Ethernet SA1/DA1
Ethernet SA2/DA2
Physical port with some attributes
A flow can only be generated by one mapper
Flows are mapped to a Ethernet link
A link can carry multiple flows
Flow packetizer
Flows
ethID=1 mapperID=1 flowID=1
ethID=2 mapperID=1 flowID=2
ethID=1 mapperID=2 flowID=3
Equivalent to JK 'segments'. Puts data streams from mappers into buffers and creates the packets. Streams in, blocks (packets) out. Seqnum/time is also generated here.
Described in terms of 1) wiring and 2) parameters needed to execute their function
An aware mapper can create multiple flows
An agnostic / simple tunneling mapper creates one flow
Mappers
cpriID=1 mapperID=1
cpriID=1 mapperID=2
A functional element which extracts containers from basic frames. Only relevant in structure aware mappers.
A mapper can only send a given container can only go to one flow in a given modulo index
A CPRI link can feed multiple mappers (usually one)
A mapper can be feed by only one CPRI link
CPRI Ports
CPRI1
Physical port with some attributes

Parameter Priority

- Relevant parameters may be assigned anywhere in the hierarchy
- Parameters in the flow take priority over those defined by the link

- e.g. A link may be assigned an encryption parameter. A flow may have a different one. The flow parameter takes priority

RoE Parameters

- Relates differently to different mapper types.
- A given flow should only support one type of mapper
- In the case of simple tunneling and structure agnostic mappers, only one flow is created.
- For structure aware mappers, each flow can only have one mapper, mappers 'belong' to flows
- Requires enumeration
  - Parameters at different levels
  - RoE.link.*parameter*
  - RoE.flow.*parameter*
  - RoE.mapper.*parameter*
  - RoE.mapper.container.*parameter*
    - *mappers can have multiple flows (containers)*

Link Parameters

- Unique SA/DA pair
- .encryption(encryption scheme)
  - 0 (default, no encryption)
  - 1:15
- .compression(compression scheme)
  - 0 (default, no encryption)
  - 1:15
- Example
  - RoE.link.ethID=2
  - RoE.link.encryption = 0
  - RoE.link.compression = 0
    - Means Ethernet link 2 has no encryption or compression (unless overridden by a flow parameter)

This is where KB parameters would be defined.
Incl. rate, flow list, transit time, etc.

Applies to ALL links (regardless of the underlying mapper type)

Flow Parameters

- .flowID (unique identifier for SA/DA pair)
  - 0 - NIL (~~unspecified ID~~ control)
  - 1..255
- .mapperID & .ethID
  - Describes the flows connectivity
  - 0..255 & 0..255??
- ~~.flowDir (direction)~~
  - ~~UL/DL/Bi~~
  - ~~A UL/DL pair shall share the same flowID~~
- .encryption(encryption scheme)
  - 0 (no encryption)
  - 1:15
- .compression(compression scheme)
  - 0 (no encryption)
  - 1:15

Similar to JK 'segments'
A flow takes the mapper output and connects it to a link.
.num would be described here.

Flow parameter example

- RoE.flow.flowID =3
- RoE.flow.ethID = 1
- RoE.flow.mapperID = 2
- ~~RoE.flow.flowDir = Bi~~
- RoE.flow.encryption= 0
- RoE.flow.compression= 1
  - Means that Ethernet port 1 is associated with flowID 3 which is associated with mapper 2
  - ~~It is bidirectional (symmetrical)~~
  - Has no encryption
  - Uses compression scheme 1

Simple tunneling mapper parameters

- .cpriID
  - Which CPRI port this mapper is associated with
- Simple incrementing seqnum or timestamp
  - .pMax=fsp , .pInc=1 , .pVal=0 & .pProp=1
  - .qMax=0 , .qInc=1 , .qVal=0 & .qProp=1
  - Are constants in all cases
  - No need to actually set up these parameters (they are implicit)
- Example
  - RoE.mapper.mapperID=6
  - RoE.mapper.cpriID=2
    - Means mapper 6 is associated with CPRI port 2

Structure agnostic mapper parameters

- .cpriID
  - Which CPRI port this mapper is associated with
- ~~.lenBasicFrame~~
  - ~~How many octets to take from the beginning of each basic frame~~
- .numBasicFramesPerPacket (in flow packetizer)
  - How many basic frames a given packet contains *(redundant with length field?)*
- .pMax , .pInc , .pVal & .pProp
- .qMax , .qInc , .qVal & .qProp
  - Sequence number definitions
  - Perhaps these can be formulated (later)

Example

- RoE.mapper.mapperID=7
- RoE.mapper.cpriID=2
- ~~RoE.mapper.lenBasicFrame =16~~
- RoE.flow.numBFPerPacket = 20
- RoE.mapper.pMax =95
- RoE.mapper.qMax =5
- etc.
  - Mapper 7 takes 16 octets from each basic frame in CPRI link 2
  - Each packet contains 20 basic frames *(redundant if we add length field?)*
  - It's p&q counters wrap at 95 & 5 etc.

Motion 13

- Agree on Hierarchy on p3-5 of tf3_1512_maiden_control_hierachy_3.pdf
- Agree on parameter priority p6 of tf3_1512_maiden_control_hierachy_3.pdf
- Richard Maiden making the motion
- Seconded by Yasser Bajwa

- Technical motion (>=2/3)

- Yes: 8, no: 0, abstain: 0

Motion 14

- Agree on baseline proposal for Link parameters p8, flow parameters p9, simple mapper parameters p11 and structure agnostic mapper parameters p12 tf3_1512_maiden_control_hierachy_3.pdf

- Richard Maiden making the motion
- Seconded by Raz Gabe

- Technical motion (>=2/3)
- Yes: 8, no: 0, abstain: 0

Thank-you