Control Hierarchy

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15th December 2015

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 (no other _)

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)

NEW slide

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 sequence number
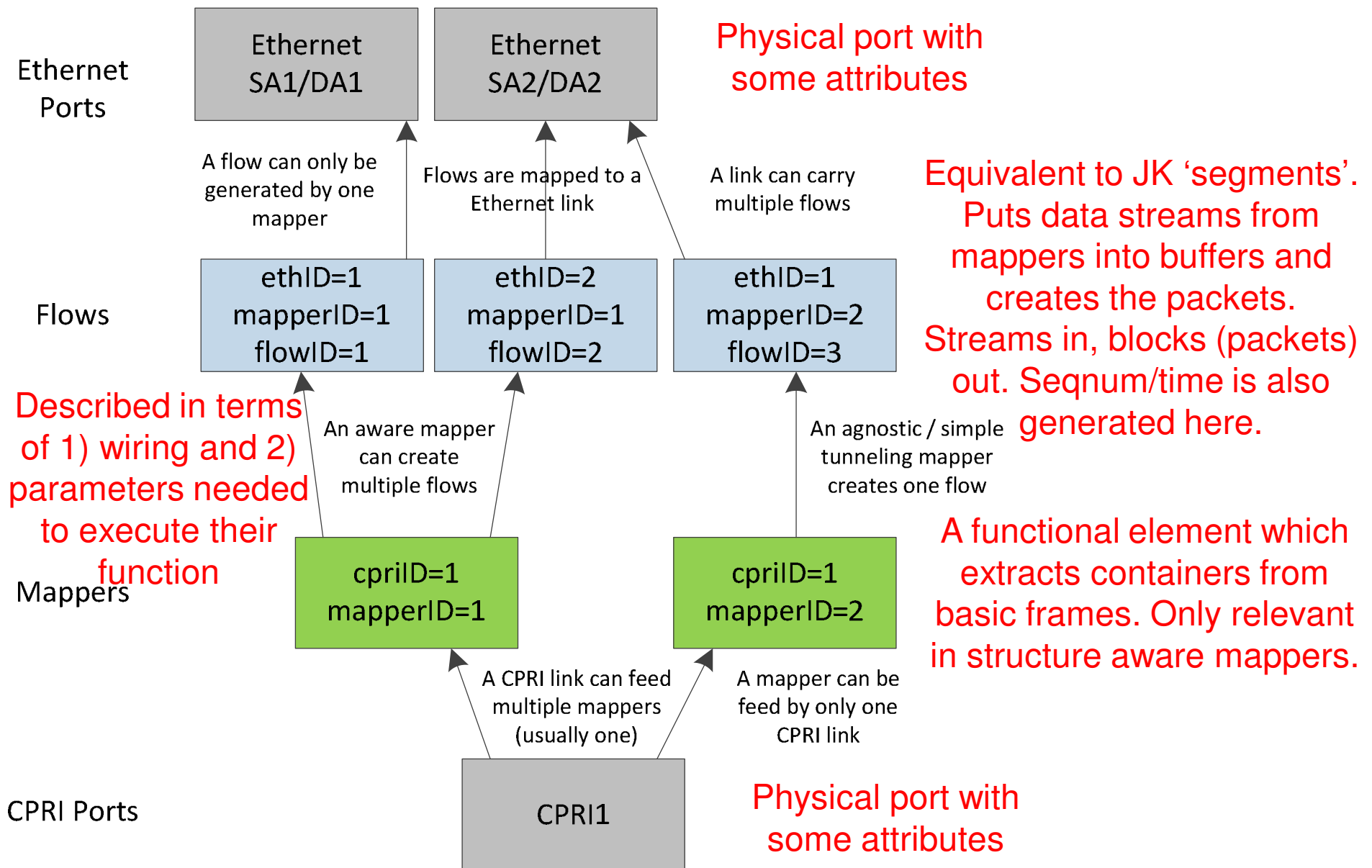
   – A mapper has information about **containers**

❑ **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 may be for UL/DL or both

   – 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. (?)

Simply reduces the number of parameters. Maybe its not useful?

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

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.

Flows

| ethID=1 mapperID=1 flowID=1 | ethID=2 mapperID=1 flowID=2 | ethID=1 mapperID=2 flowID=3 |

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

A functional element which extracts containers from basic frames. Only relevant in structure aware mappers.

Mappers

| cpriID=1 mapperID=1 | cpriID=1 mapperID=2 |

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

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.~~flow~~container.*parameter*

• *mappers can have multiple flows (containers)*

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

Link Parameters

❑ Unique SA/DA pair

❑ .encryption(encryption scheme)
  – 0 (default, no encryption)
  – 1:15

❑ .compression(compression scheme)
  – 0 (default, no encryption)
  – 1:15

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

❑ 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)

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

Flow Parameters

❑ .flowID (unique identifier for SA/DA pair)
  – 0 (~~unspecified ID~~ control)
  – 1..255

❑ .mapperID & .ethID
  – Describes the flows connectivity
  – 0..31 & 0..15 ??

❑ .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

Equivalent 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

New addition. Misinterpreted from JK, but seems reasonable / useful?
- – 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.mapper.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.

Structure aware mapper - .ctrl

❑ We have separate packets for C-plane

❑ What if control information is put in the U-plane?

❑ Is it in every basic frame?

❑ Only relevant to structure aware mapper

- CPRI-RoE----RoE-CPRI
  - Just treat control as if it were data
- RoE----RoE
  - Use control packet (there is no U-plane)
- CPRI-RoE----RoE (& visa versa)
  - Use control packet
  - Mechanism needed...   Non longer relevant.
                              We'll use flowID=0

Motion

- Agree on Hierarchy on p2-5 of this document
- Agree on parameter priority p6 of this document

Motion

- Agree on Link parameters p7 of this document
- Agree on flow parameters p8 of this document
- Agree on simple tunneling mapper parameters p10 of this document
- Agree on structure agnostic mapper parameters p11 of this document

Motion

❑ Remove .ctrl parameter from structure aware mapper

Thank-you