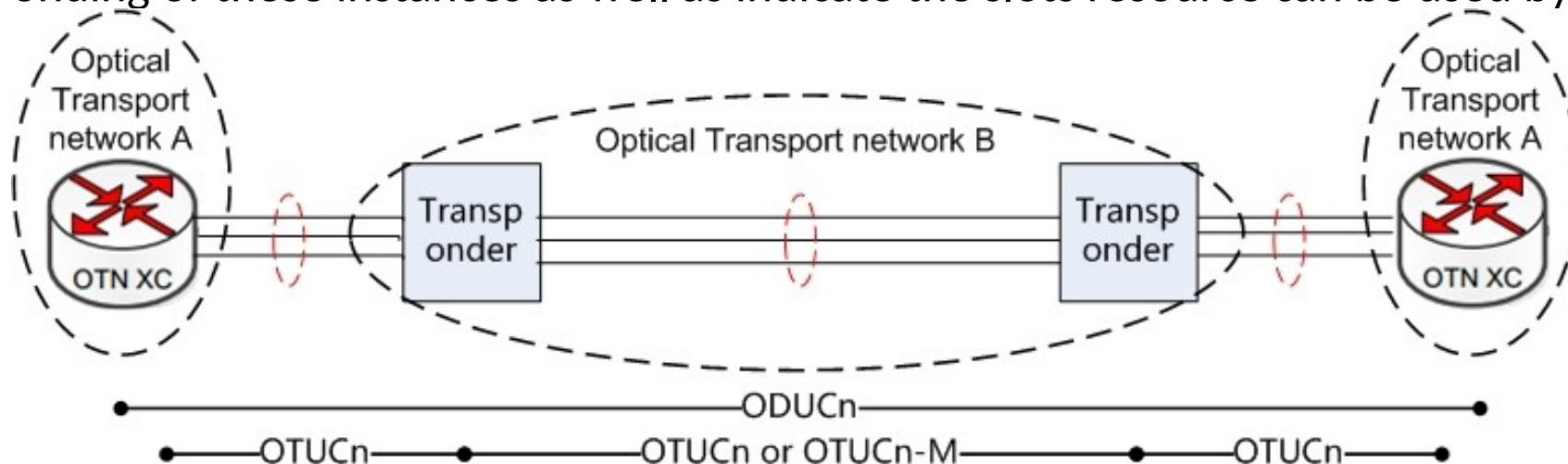# draft-merge-ccamp-otn-b100g-fwk-02

Authors: Qilei Wang(ZTE), Radha Valiveti (Infinera), Haomian Zheng (Huawei), Huub van Helvoort(Hai Gaoming B.V), Sergio Belotti (Nokia), Iftekhar Hussain (Infinera), Daniele Ceccarelli (Ericsson)

Contributors: Rajan Rao (Infinera), Fatai Zhang, Italo Busi , Zheyu Fan (Huawei), Yuanbin Zhang (ZTE), Zafar Ali (Cisco), Daniel King, Manoj Kumar, Antonello Bonfanti, Akshaya Nadahalli (Cisco)

Changes

- A new section 5.2 is added to describe what is OTUCn/OTUCn-M/ODUCn LSP.

- What is OTUCn/OTUCn-M/ODUCn LSP?

  - An OTUCn/OTUCn-M/ODUCn LSP is a number of end-to-end OTUC/ODUC instances bonded together as one group.

  - Control plane mechanism is needed to finish the setup of OTUCn/OTUCn-M/ODUCn LSP by bonding of these instances as well as indicate the slots resource can be used by client signal.

Changes

- Setup of ODUk over ODUCn can reuse mechanisms defined in RFC713 9. As one configured ODUCn link has almost the same features as OD Uk except 5G TS granularity. B100G control plane technology mainly f ocus on the setup of OTUCn/OTUCn-M/ODUCn LSP.

- Section 4.3, 4.4 and 4.5 are combined into one category, as they all re present the transportation of non-OTN client signals over ODUflex the n over ODUCn connection.

draft-merge-ccamp-100g-signalling-00

Authors: Qilei Wang(ZTE), Haomian Zheng (Huawei), Radha Valiveti (Infinera), Huub van Helvoort(Hai Gaoming B.V), Zafar Ali (Cisco)

Contributors: Iftekhar Hussain (Infinera), Zheyu Fan (Huawei), Yunbin Xu (CAICT), Sergio Belotti (Nokia),

Overview of the extensions

- A new encoding type "G.709 ODUCn" is defined, because ODUCn plays a digital section layer roles instead of digital path layer (ODUk).

- Four new G-PIDs are introduced, as they don't exist in G.709-2012
  - ODUk over ODUCn via 5G Gbps TS granularity.
  - Transportation of FC-3200 over ODUflex.
  - Transportation of FlexE client signal over ODUflex.
  - Transportation of FlexE aware signal over ODUflex.
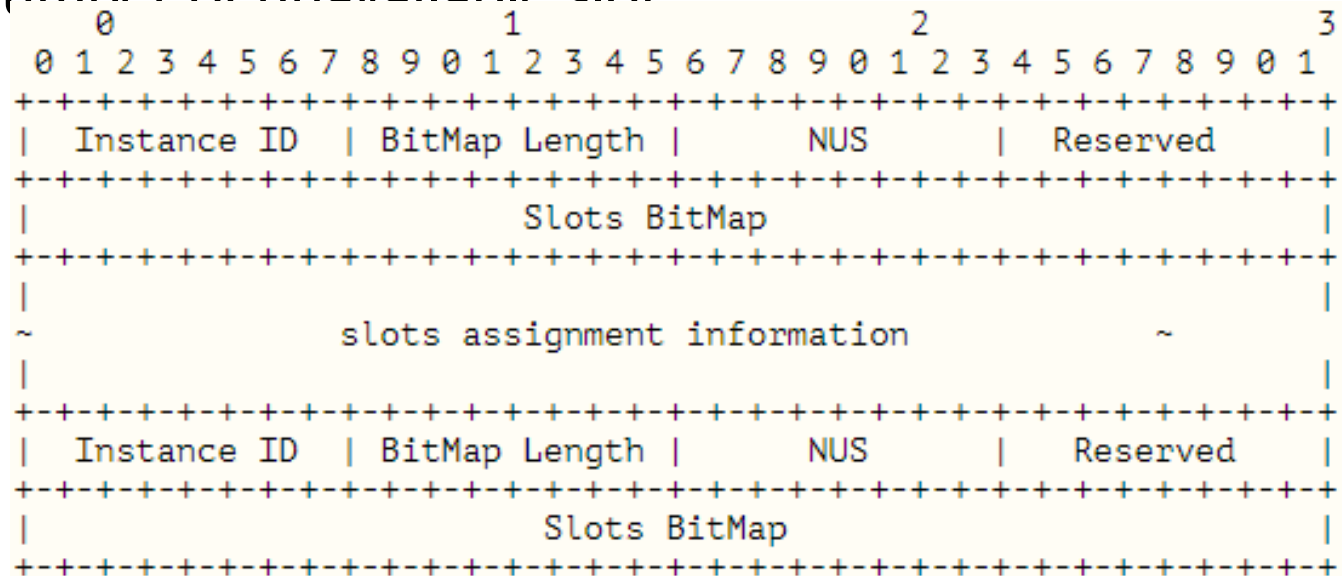
Overview of the extensions

- Traffic parameters for ODUCn
  - Signal Type: OTUCn/OTUCn-M/ODUCn
  - n: equal to the number of the OTUC/ODUC/OPUC instances requested
  - MT: similar as that defined in RFC4328
  - Bit_Rate: indicate the nominal bit rate of OTUCn/OTUCn-M/ODUCn.

```
 0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Signal Type  |       n       |       Multiplier (MT)         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                            Bit_Rate                           |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Overview of the extensions

- Label
  - Instance ID: identifier of each OTUC/ODUC instance bonded.
  - BitMap Length and slots BitMap: can be used to indicate position of unavailable slot when signalling is used to set up OTUCn-M/ODUCn path .
 - NUS: number of unavailable slot

```
     0                   1                   2                   3
 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Instance ID  | BitMap Length |       NUS      |   Reserved    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Slots BitMap                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                                                               |
~                  slots assignment information                 ~
|                                                               |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|  Instance ID  | BitMap Length |       NUS      |   Reserved    |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
|                          Slots BitMap                         |
+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+-+
```

Overview of the extensions

- Unavailable slots collection TLV, which is a new kind of LSP_ATTRIBUTE TLV, is extended to collect the unavailable slot information for end-to-end ODUCn LSP, as one ODUCn LSP may span many OTUCn/OTUCn-M capable nodes.

- The IF_ID RSVP_HOP object must be used in Resv message, and it contains several TLVs with each of them has an one-to-one relationship to the instance in the label making explicit which component interface is carrying a specific OTUC/ODUC instance.

Signalling Procedures

- How to set up an end-to-end 250G ODUC3 LSP in the network depicted in the picture?
  - Case of the setup of hierarchical LSP, one end-to-end ODUC3 LSP over 3 OTUCn/OTUCn-M LSPs.
  - Traffic parameters for OTUC3 {signal type = OTUCn, n = 3, bit_rate=300G};
  - Traffic parameters for OTUC3-50 {signal type = OTUCn, n = 3, bit_rate=250G};
  - Traffic parameters for ODUCn {signal type = ODUCn, n = 3, bit_rate=250G};
  - Unavailable slots collection TLV is carried in the path message in the case of OTUCn-M or ODUCn which spans OTUCn-M link to collect the number and position of unavailable slot information end-to end. As the slot does not support switching, the signalling can easily get the result which slots are unavailable.
  - Label for OTUC3 {instance ID, NUS = 0; BitMap Length = 0};
  - Label for OTUC3-50 {instance ID, NUS = 10; BitMap Length = 20; Slots BitMap: which slots are unavailable}
  - Label for O   {in   ID, N   B   en   th   Bi   which   vailable}

9
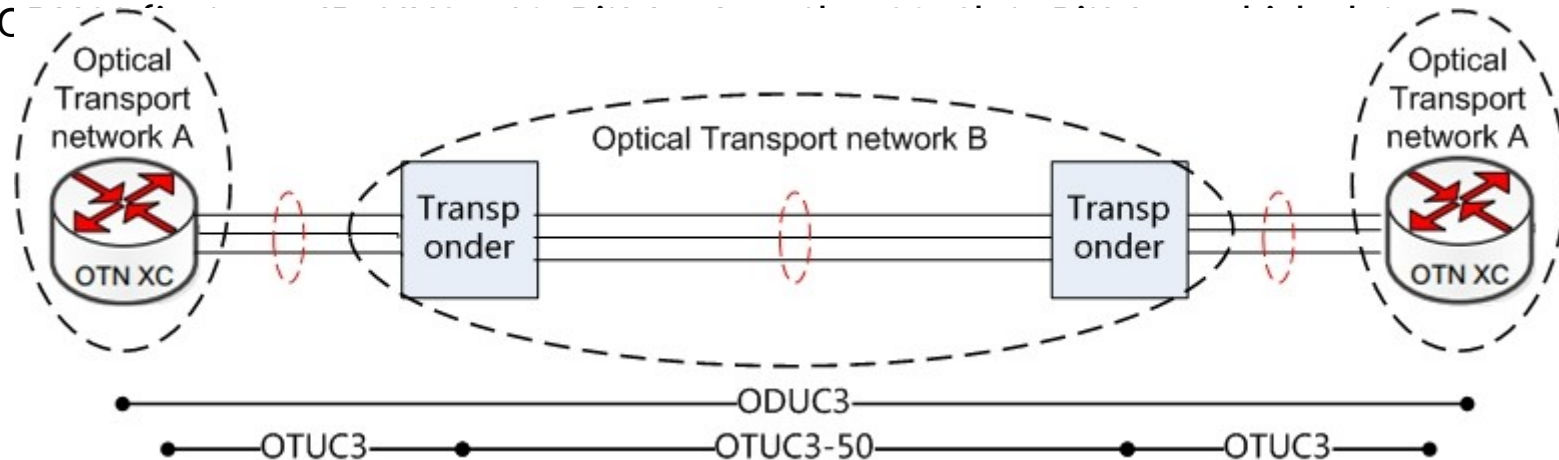
Open issue

- ODUCn/OTUCn/OTUCn-M cannot be switchable, why is there so called "end-to-end ODUCn/OTUCn/OTUCn-M LSPs"? because there is no "LABEL" to be switched.

- The signalling is used to bond several different instances. How can we define this bonding action?

- Is there bonding of OTUC instances in one OTUCn? Does OTUCn-LSP need to be explicitly specified?

Next steps

- Keep discussing fwk and solutions. Alignment work between fwk, sign alling and routing drafts is also needed.

- Need to discuss whether all the use cases documented in fwk draft are needed. If not, will remove them.