

# RSVP-TE Signaling Extensions in support of Flexible Grid

CCAMP WG, IETF 82nd, Taipei, Taiwan

draft-zhang-ccamp-flexible-grid-rsvp-te-ext-00

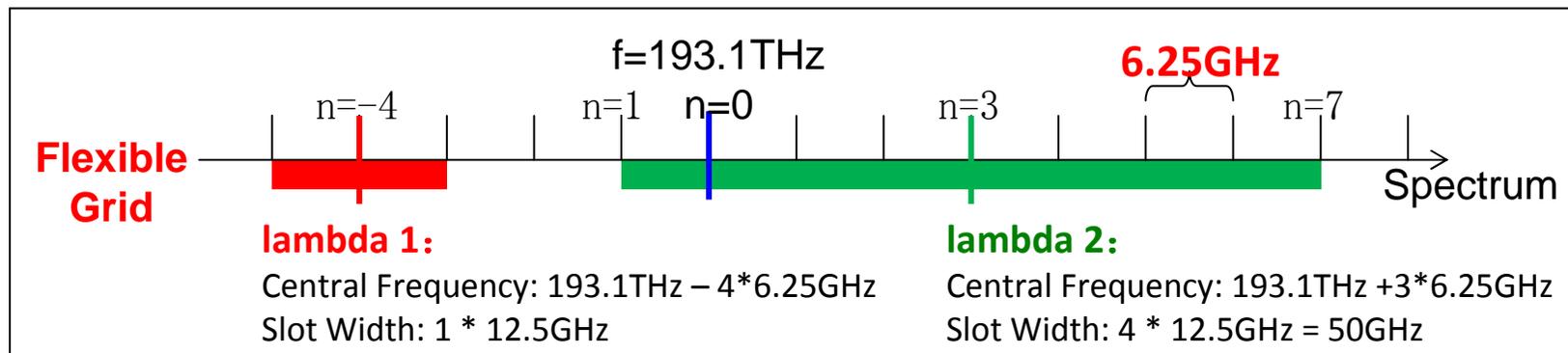
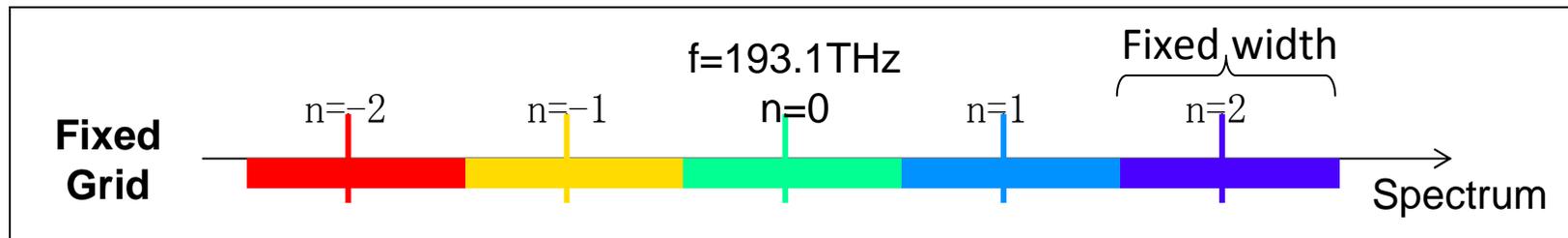
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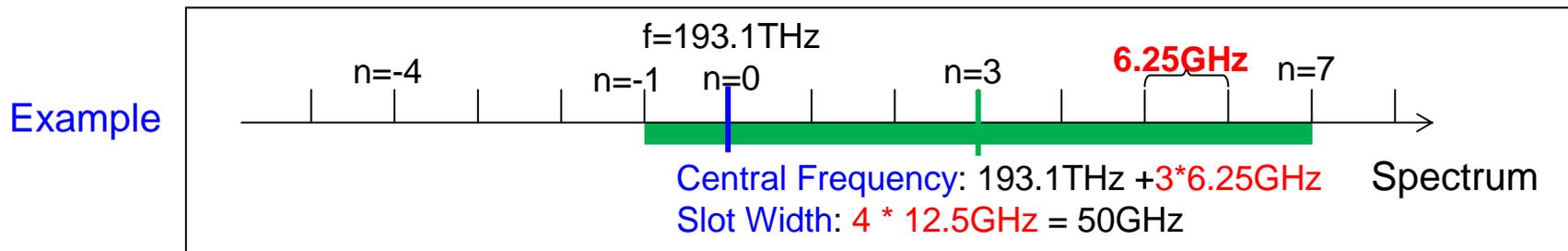
# Flexible Grid in ITU-T

- ITU-T G.694.1: define new Flexible Grid in the scope of DWDM
  - The slot width of a wavelength is flexible ( $m * 2 * 6.25\text{GHz}$ )
  - Introduce a new Channel Spacing ( $6.25\text{GHz}$ )



# RSVP-TE Extensions

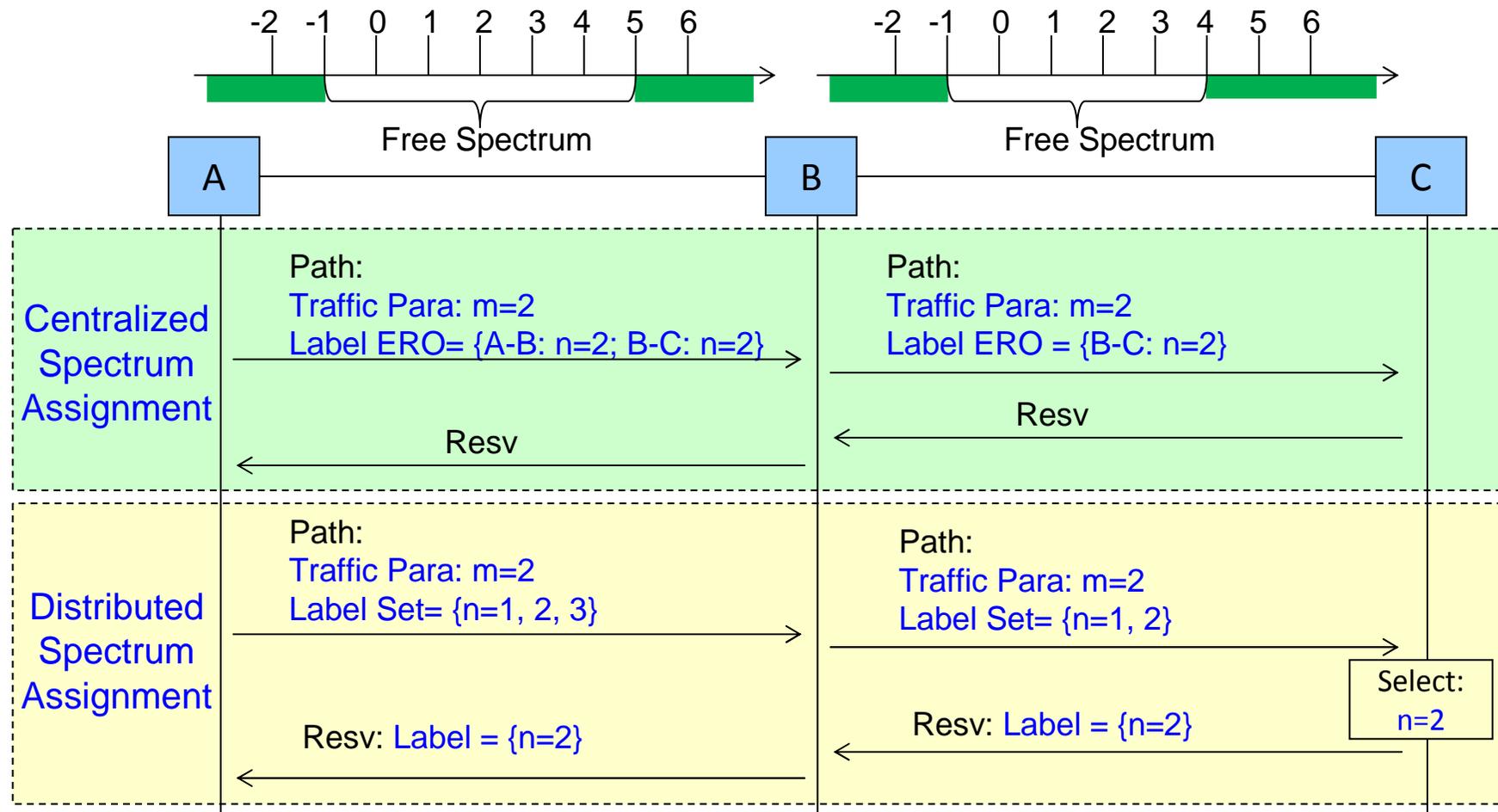
- **Traffic Parameters:** indicates **how much spectrum resource is requested** for an LSC LSP
  - The requested slot width =  $m * 12.5\text{GHz}$
- **Generalized Label:** indicates **which spectrum resource is reserved** by the LSP
  - Same format as RFC6205
  - **Grid:** Flexible Grid is in the scope of DWDM, so **Grid = 1 (DWDM)**
  - **C.S.:** a **new Channel Spacing (6.25GHz)** is introduced
  - **n:** Indicates the **Central Frequency** (i.e.,  $(193.1 + n * 0.00625)$  THz)
  - Since the Slot Width is indicated in Traffic Parameters, it's not needed to be included in Label



Traffic Parameters	<b>m=4 (4*12.5G)</b>		Reserved	
Generalized Label	<b>Grid= DWDM</b>	<b>C.S.= 6.25G</b>	Identifier	<b>n = 3</b>

# Signaling Procedures

- **Centralized Spectrum Assignment:** Spectrum on each link is pre-assigned
- **Distributed Spectrum Assignment:** Select available spectrum on each link via Label\_Set Object

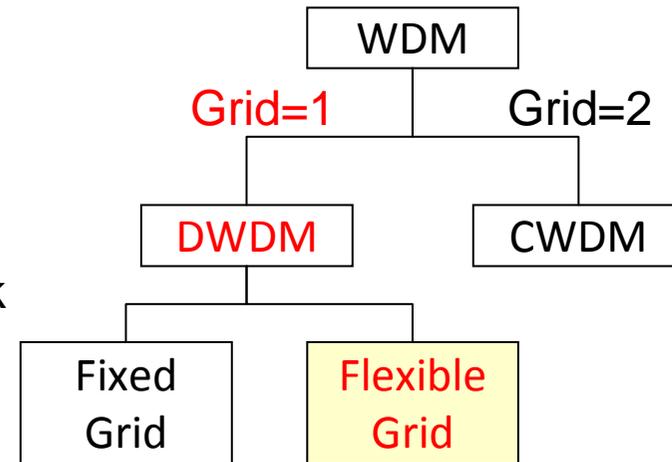


# Discussion1: Traffic Parameters

- Why we **carry "m" in traffic parameters**?
  - In WDM, the **resource is spectrum**
  - **Flexible Grid**: "m" represents **how much spectrum is requested** for an LSC LSP
  - **GMPLS**: traffic parameters represents **how much resource is requested** for an LSP
  - **Straightforward!**
- Why we **don't carry the data bit rate** (e.g., 40G, 100G) in traffic parameters?
  - The data bit rate is in fact **the bit rate of the client signals** of a LSC LSP
  - In GMPLS, traffic parameters carry **the "bandwidth" of the requested LSP**, NOT the bandwidth of the client signals of the requested LSP
    - E.g., to create LO ODU1 to carry GE client signal, the traffic parameters are "ODU1", NOT "GE"
  - Cannot **deduce how much spectrum to be reserved** based on the data bit rate
    - No direct mapping between actual data rates (bps) and spectrum (Hz)
  - **The intermediate nodes don't need to care about the bit rate**, but they must understand the spectrum (slot width) to create cross-connect
  - **Bit rate  $\approx$  NULL** if it is carried in the TP

# Discussion2: Grid Value

- ITU-T G.694.1: Both Fixed Grid and Flexible Grid belong to DWDM
- RFC6205: If Grid = 1, it's DWDM network



- The optimal solution:
  - Use the DWDM label (i.e., Grid=1) defined in RFC6205 for Flexible Grid, without any format changing
    - It can indicate the central frequency (indicated by "n") of the reserved lambda
    - Since the slot width (indicated by "m") is carried in the traffic parameters, it's not necessary to carry "m" in the label
  - Fully consistent with both existing ITU-T and IETF standards

# Next Steps

- Monitor the progress of ITU-T work
- To determine how to carry the central frequency & slot width in RSVP-TE
- Refine it according to the feedback from the meeting or mailing list