100G EPON wavelength plan discussion

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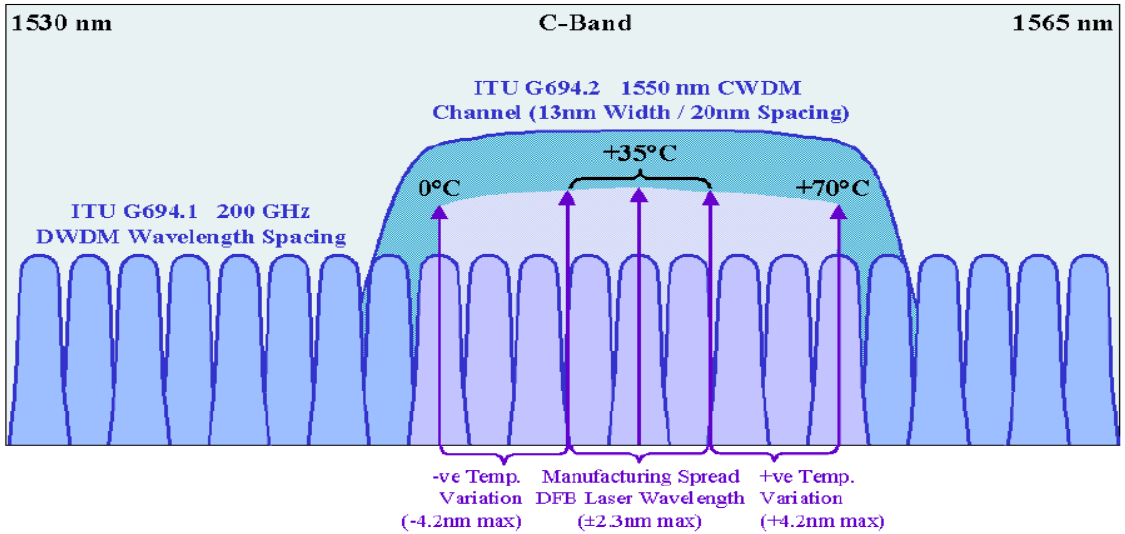
Motivating factors

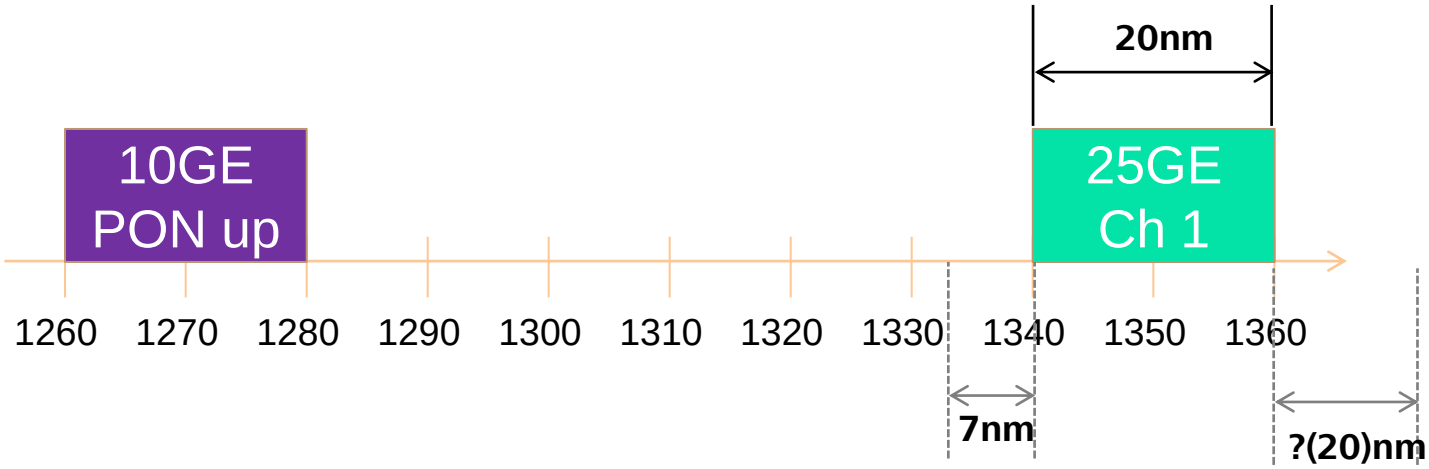
- 1st priority should be towards a cost effective 25G system
  - Uncooled ONUs for outdoor operation
  - O-band wavelength plan for upstream to enable simple NRZ modulation in ONU transmitter
  - Reuse existing industry chain/components as much as possible
- 100G system should also be considered as a 2nd priority
- Coexistence with previous generation PONs as much as possible should be considered

Uncooled ONUs for outdoor operation – Channel spacing > 26.5nm



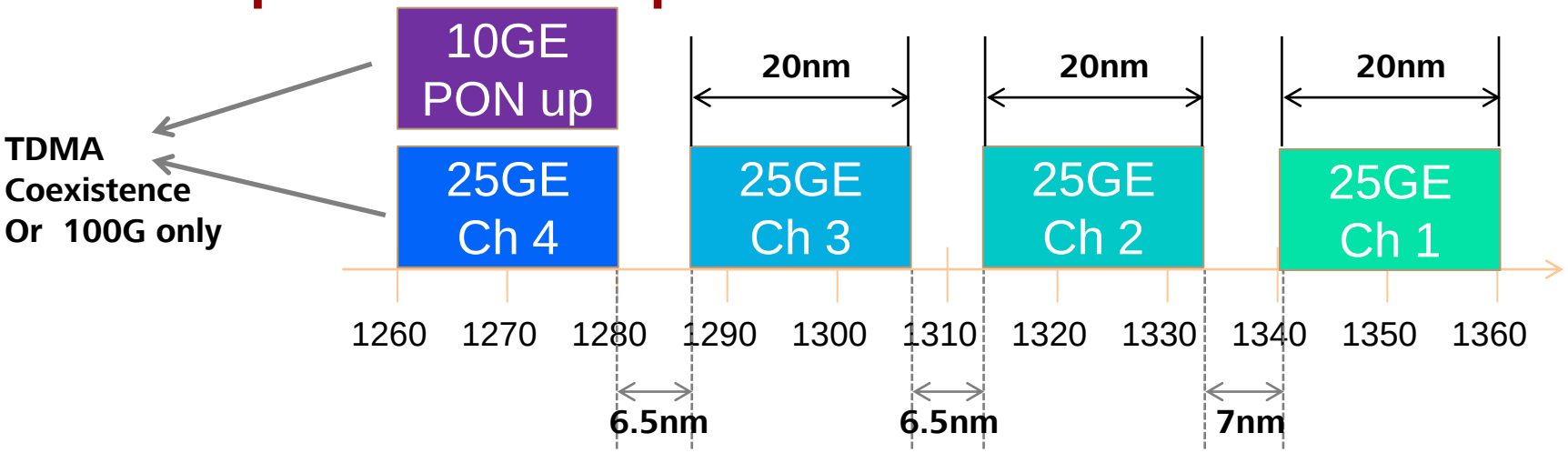
- Traditional CWDM 20nm spacing only enables indoor operation (0~70℃), 13nm operating band, 7nm guard band
  - +/- 2.3nm DFB laser wavelength variation, 0.12nm/℃ * 70℃ = 8.4nm
- Outdoor uncooled operation needs at least 19.6nm operating band, which is what we did in 10G-EPON
  - +/- 2.3nm DFB laser wavelength variation, 0.12nm/℃ * 125℃ = 15nm
- Guard band can be shared by two adjacent channels, guard band can also go to the water peak band.

25Gb/s channel Upstream



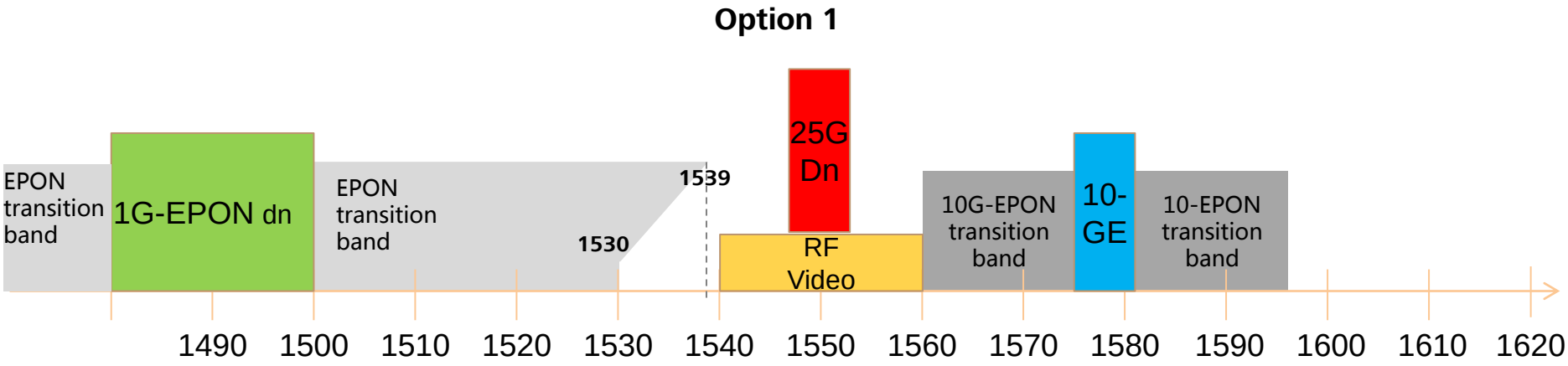
- 25G system channel upstream wavelength : 1350±10nm,
  - 20nm enables outdoor operation,
  - 7nm guard band allows 3nm transition band plus +/-2nm for central wavelength tolerance for WDM filters.
- First 25G system can coexistent with 10G-EPON by WDM to enable high upstream bandwidth efficiency, no need to throw the 10G OLT modules away.
- Still keep the rest of O-band wavelength for 100G EPON.

100G possible upstream solution



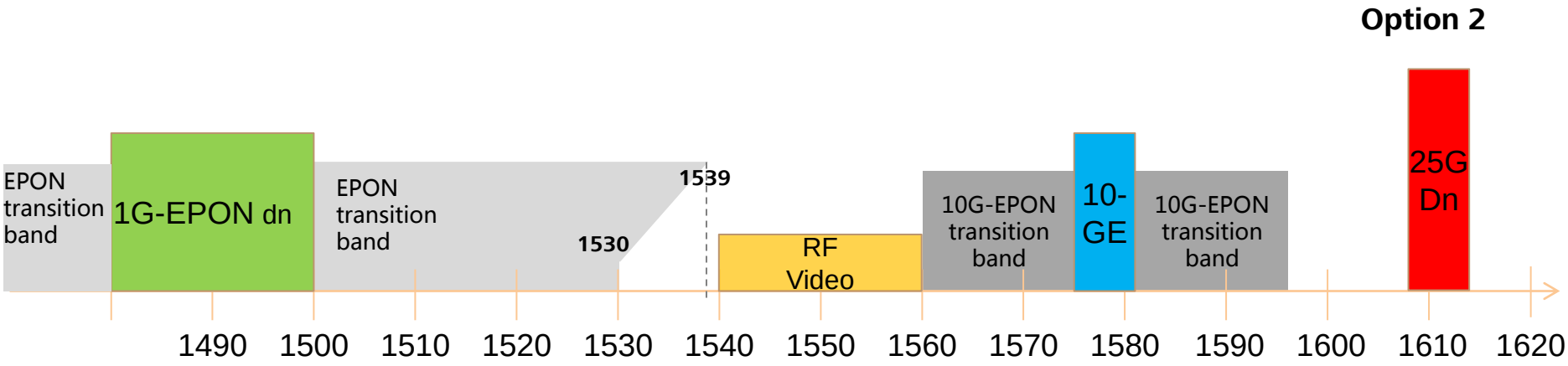
- Four channels: 1350±10nm, 1323±10nm, 1296.5±10nm, 1270±10nm,
- The first three 25G channels are coexistent with 10G-EPON by WDM.
- When 100G EPON begins to deploy, most 10G-EPON users should have gone. The remaining few can coexist with 100G-EPON by TDMA in upstream.
- Four uncooled wide band channels can be available for 100G EPON, which allows a low cost system for 100G EPON too.

25G, Downstream Option 1



- 10G EPON ONUs transition band must be avoided, which enables all the existing 10G EPON ONUs to block the new downstream wavelength for 25G.
- For downstream, 5nm operating band and some necessary guard band, same as 10G-EPON, is recommended. The economics of the blocking filters in the ONU must be considered.
  - Narrow channel spacing, such as 400GHz for 25G DS, should be avoided, unless absolutely necessary.
- C-band industry chain is quite mature for transmission systems, which is also an easy band for optical amplifier.
- Coexistence with RF video may need to be given up. (Too close to RF results in isolation difficulty)

25G, Downstream Option 2



- 5nm operating band in L+ band is recommend for 25G downstream with sufficient guard band for other systems (including other channels in 100G EPON)
- Re-using the existing CWDM laser, 1611±2.5nm seems a good choice.
- The L-band enables coexistence with most existing PON systems.

Summary

- Some wavelength plans for 100G-EPON are analyzed

- 100G-EPON wavelength plan should target low cost for 25G-EPON OLT/ONUs as the first priority, the following considerations are suggested:
  - 20nm operating band in O-band for upstream
  - 5nm operating range in 1551nm or 1611nm band for downstream

Straw Poll

- **I would support an upstream wavelength range of 1350±10nm for the initial high priority low cost 25G single channel system**
  - **Agree: ____**
  - **Disagree: ____**
  - **No opinion: ____**

Thank you

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