Considerations on the Downstream Wavelength and Line Coding

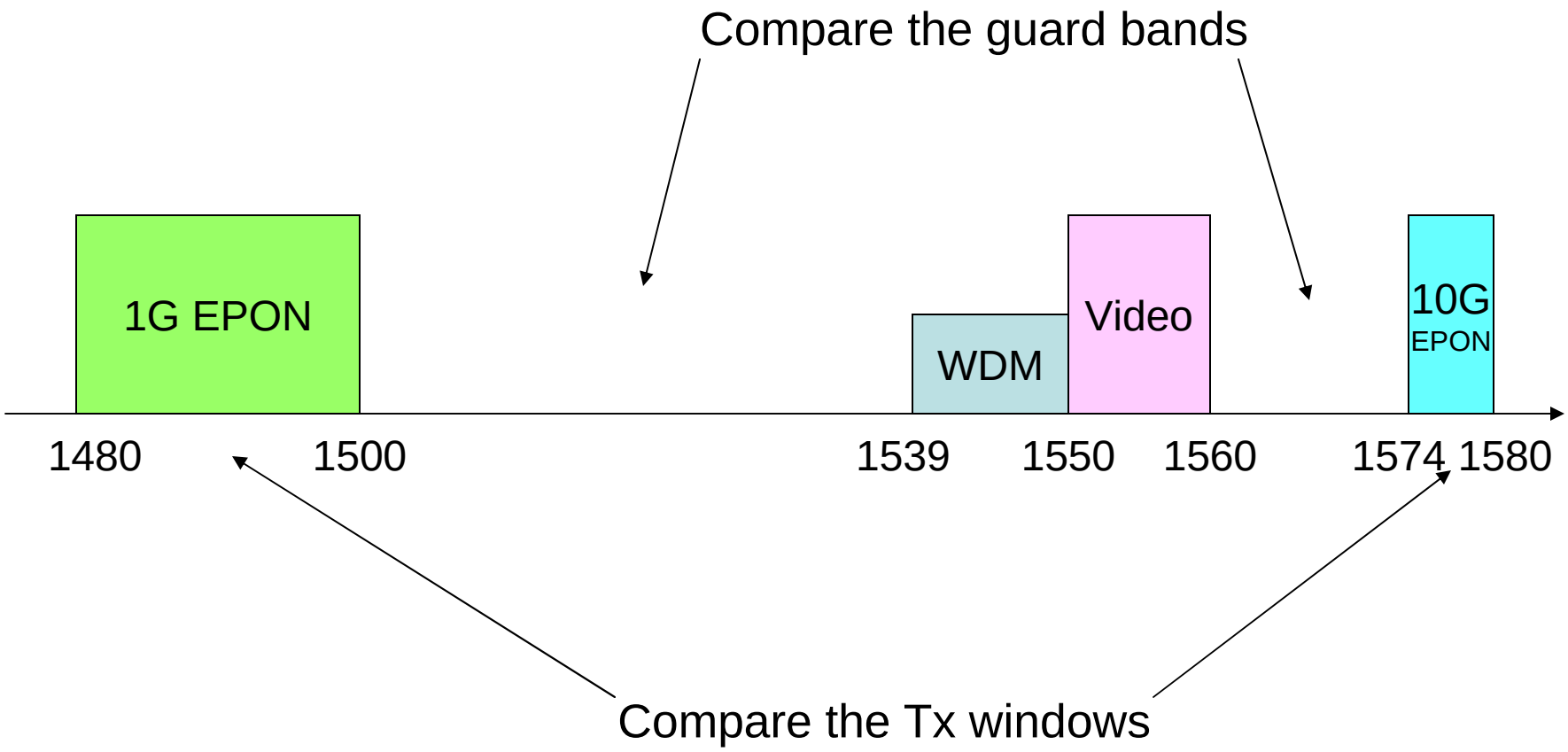
Frank J. Effenberger

Huawei Technologies Co. Ltd

Outline

- Review of current proposal
- Discussion of options
- Suggested next steps

Current Spectral Proposal



How did we get here?

- The previous round of ‘enhancement’ got a pretty ‘loose’ treatment
  - We got lots of push-back from optics vendors
    - Non-collimated optical designs
    - Low cost
    - Wide windows for the transmitters
- Why, then, is the new plan asking for such ‘tight’ specifications on the 10G system?
  - There is an inconsistency in the technical assessment of the optics – it’s not fair

What happened beyond 1580nm?

- There are allegedly certain OTDR filters that may cut off at 1580nm
- In fact, most OSP components are ‘rated’ to go to 1600nm, and continue to operate to 1650nm (albeit at reduced specifications)
  - The ITU G.671 even goes out to 1660nm
  - Most OTDR equipment operates at 1625nm
- Even the previous round of ‘enhancement’ left the long wavelength band open to long wavelengths

Discussion of options

- The 1577nm option seems overly strict
  - Transmitter thermostatting required
  - Filter must be a ‘collimated design’
- We would like a way out of this problem
  - Define two wavelengths: 1490 and 1577?
  - Push new wavelength out: 1590nm
  - Consider compatible line code at one of the old wavelengths

0. Two wavelengths: A bad idea!

- First, it violates the ‘one problem – one solution’ rule of IEEE
  - The strategy of using 1577 for one class, and 1490 for the other classes is not desired – there is unwanted linkage of wavelenth and power budget
- Second, it would split the market for TOSAs, leaving the industry in doubt
  - Wavelength choice is not an easy ‘drop in’ kind of change – it has to be grown into the wafers!
- Third, the fact that such a plan would even be entertained underlines the fact that 1577 is not a viable plan

1. Push the wavelength to 1590nm

- Reasons why this is better than 1577nm
  - It is a standard CWDM wavelength (1584~1596nm is the full range)
  - It provides for 24nm of guard band from video
  - It has a better future: Video goes away, and the whole C-band is neatly in the middle of the 1490 and 1590nm bands
- What about those bad OTDR filters?
  - Replace them! Keep in mind that OLT-side fiber rearrangement and multiplexer change-out is a given already, there is no extra cost

2. Consider a new code at old wavelengths (1490 or 1555nm)

- What if the 10G system used a new code that was electronically compatible with either the 1G system or the video signal?
  - At a basic level, 10G is alien to the 1G or 1GHz video spectrum (there is a ~9dBe ‘effective isolation’)
  - Perhaps a suitable line-code could be found that has small energy in the 1GHz passband
  - Perhaps an optical ‘code’ scheme could be developed that is essentially balanced at f<1.25 GHz
- If OLT’s are combined, 1G signals could be pre-distorted to counteract the 10G interference

Conclusion

- The 1577nm plan is technically difficult
- The two wavelength option has issues
- A minimally invasive, better solution is to push the 10G wavelength out to 1590nm
  - Should not have extra deployment impact
- A more adventurous solution is to change the 10G code such that it is compatible with 1G at the same wavelength
  - General opinions on this approach?

Thank You!