Proposal of NG-EPON to Support PtP WDM

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IEEE P802.3ca 100G-EPON Task Force

Plenary Meeting

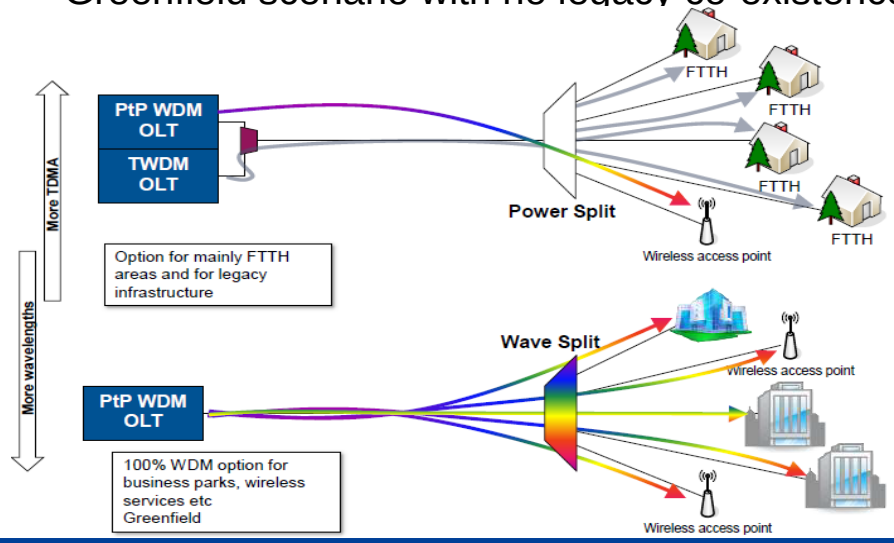
Feb 3, 2016

Topics

- PtP WDM in NG-PON2
- Bandwidth needed in Mobile fronthaul
- Mobile fronthaul may need higer than 100Gbps
- PtP WDM for Coexistence
- Summary

PtP WDM in NG-PON2【1】

- Shared spectrum is the useable wavelength band considering the scenario of full co-existence with legacy PON systems
- Expanded Spectrum fully exploits the concepts of spectral flexibility in NG-PON2 by enabling bands not being used to be utilised by PtP WDM. This option may also be most beneficial in a Greenfield scenario with no legacy co-existence limitations.



Point-to-Point Wavelength Division Multiplexing PON

PtP WDM-PON(US/DS)
- Shared Spectrum: 1603nm~1625nm
- Full Spectrum: 1524-1625 nm

PtP WDM Ch support Rates of 1G, 2.5G and 10G classes.

Bandwidth needed in mobile fronthaul

- The RRHs (Remote Radio Head) typically require 3 or 6 Gbps, 10Gbps is required in high capacity LTE systems with multiple channels.[2]

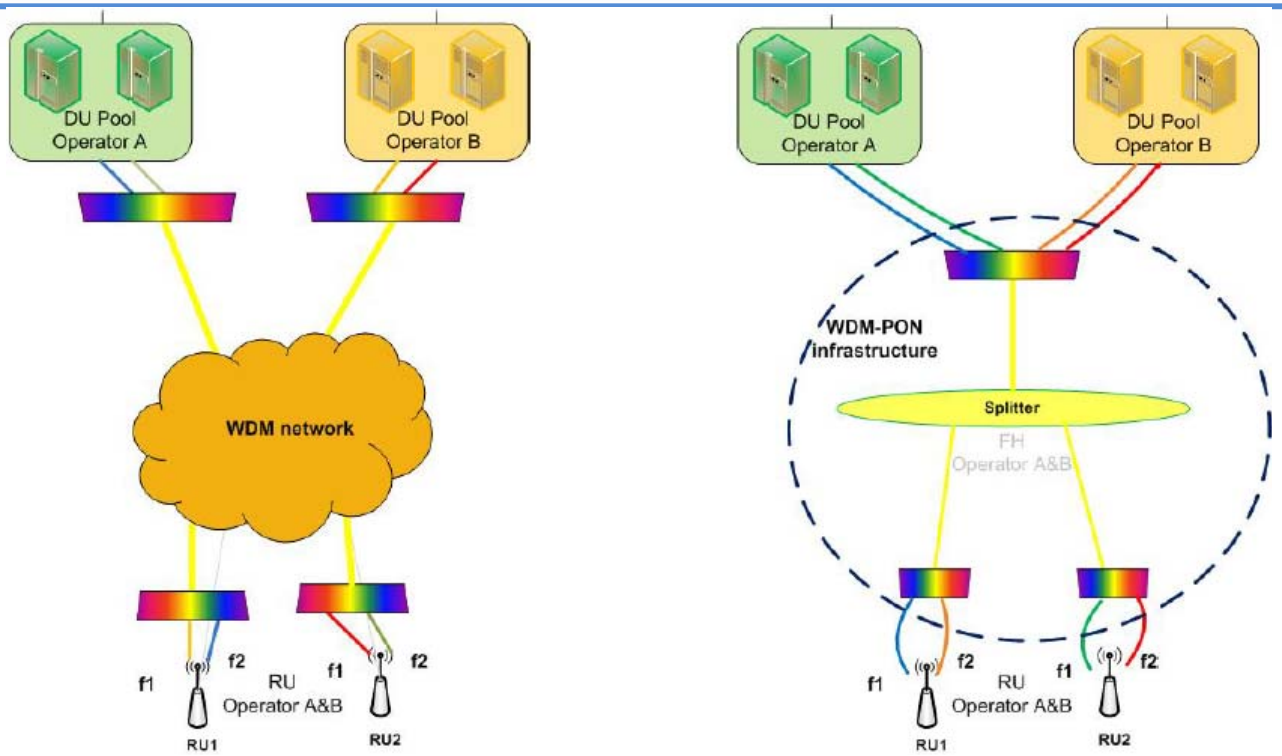
Mainstream BS CPRI Bandwidth requirement		
2013~2015(20M)	2016~2017(60M)	2018(80M)
UMTS：3*1.25G; FDD LTE：3*2.5G(2T2R) or 3*4.9G(2T4R); TDD LTE：3*4.9G(4T4R) or 3*9.8G(8T8R)	3*9.8G(CPRI7)	3*10.1G(CPRI8)

- The new CPRI Specification version7.0 adds 24G line-rate to the 10G LTE-Advanced. CPRI line bit rate option 10: 24330.24 Mbit/s, 64B/66B line coding (48 x 491.52 x 66/64 Mbit/s).

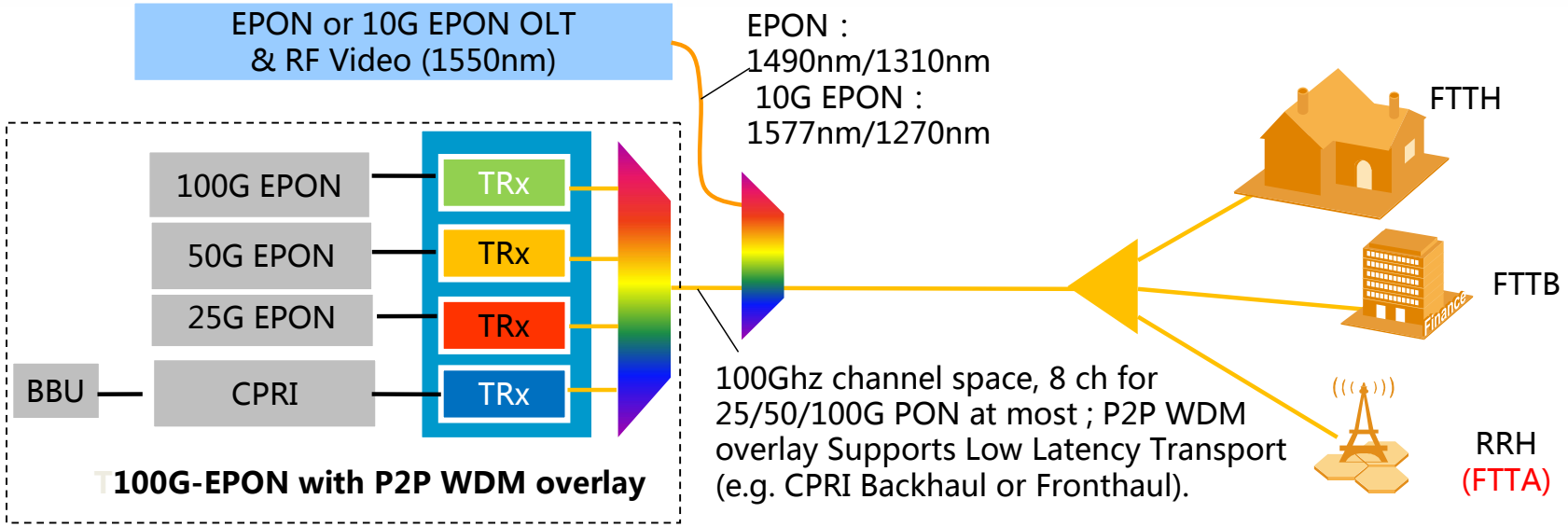
Mobile fronthaul may need higer than 100Gbps

- WDM is good for Fiber saving[3]
  Antenna site : 2G, 3G, 4G with 1 or 2 carriers for 3 sectors = 15 to 18 CPRI links (18 x 2.5 Gbit/s =45 Gbit/s symetrical) and certainly more with 5G
- C(cloud)-RAN is a new RAN architecture with centralized DU (digital unit) nodes in which all computation/processing resource could be treated as a whole and therefore allocated on demand among different nodes.[4]
- 5G will be able to sustainably satisfy the requirement of 1000x mobile data trafficgrowth. RRHs may need higher rate than 10Gbps, so dedicated WLs should be asigned to the RRHs.
- PtP WDM with enough wavelength channel pairs support higher than 100Gbps.

C-RAN on WDM infrastructure (greenfield)[4]



PtP WDM overlay Compatible with legacy ODN



Requirements for NG-EPON

- 25Gb/s,50Gb/s, and 100Gb/s in downstream, symmetric and/or asymmetric in upstream.
- WDM can be overlaid onto the same fiber for low latency services.

Summary

- C-RAN is a new RAN architecture with centralized DU (digital unit) nodes，which may lead to higher than 100Gbps mobile fronthaul links.
- RRHs may need higher than 10Gbps , so dedicated WLs should be asigned .
- PtP WDM Ch support Rates of 1G, 2.5G ,10G and 25G classes.
- Propose PtP WDM as an option to discuss.

Bibliography

[1] Martin Carroll et al.,“FSAN Highlights & NG-PON2 Standards Update”，Joint Session，February 4, 2015

[2] Li Shixing et al.,"Technical solutions for carring Common Public Radio Interface(CPRI) services" ,CCSA 2014B27, 2015

[3] Philippe Chanclou et al.,"Getting standards ready for Fiber to the Antenna" ,OFC 2015

[4] "FURTHER STUDY ON CRITICAL C-RAN TECHNOLOGIES" , NGMN ALLIANCE, 2015

Thank you