Super-PON Economic Feasibility

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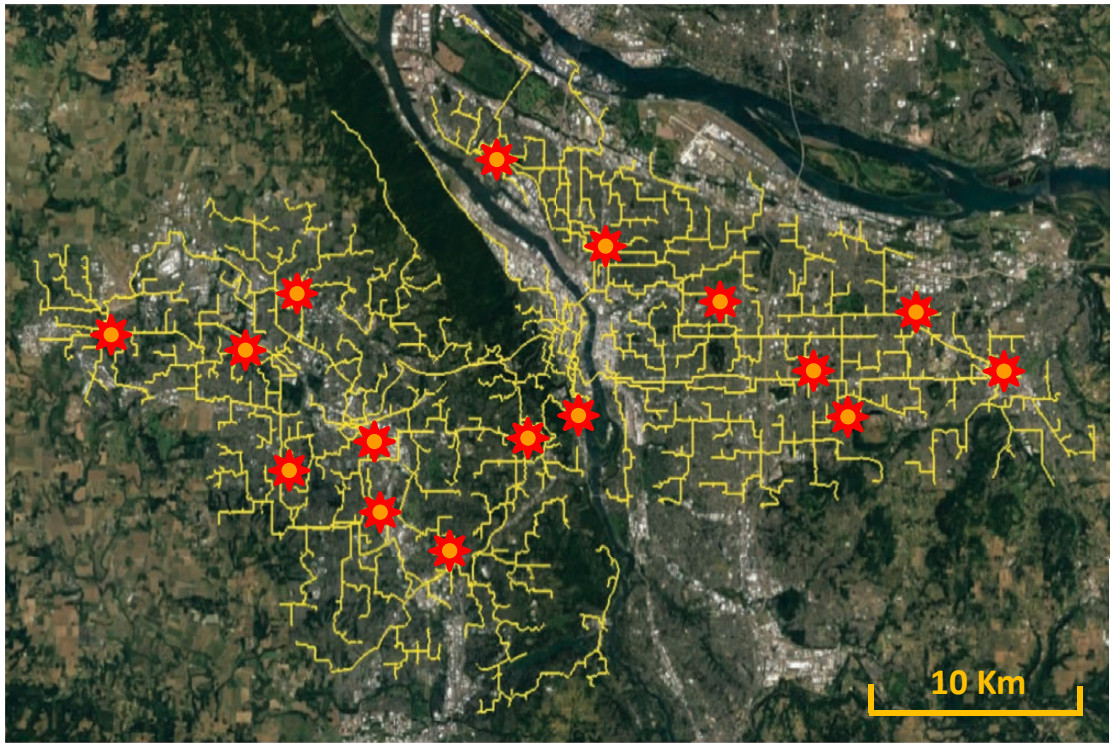
(Google)

Introduction

- At the Spokane interim meeting more data has been requested to validate the economic feasibility of a Super-PON solution
- This validation requires relative cost estimates for both outside plant (OSP) construction and optical equipment
- A example topology scenario is introduced and used as basis for the OSP analysis
- Reasonable assumptions are made to estimate the relative costs of the optical equipment

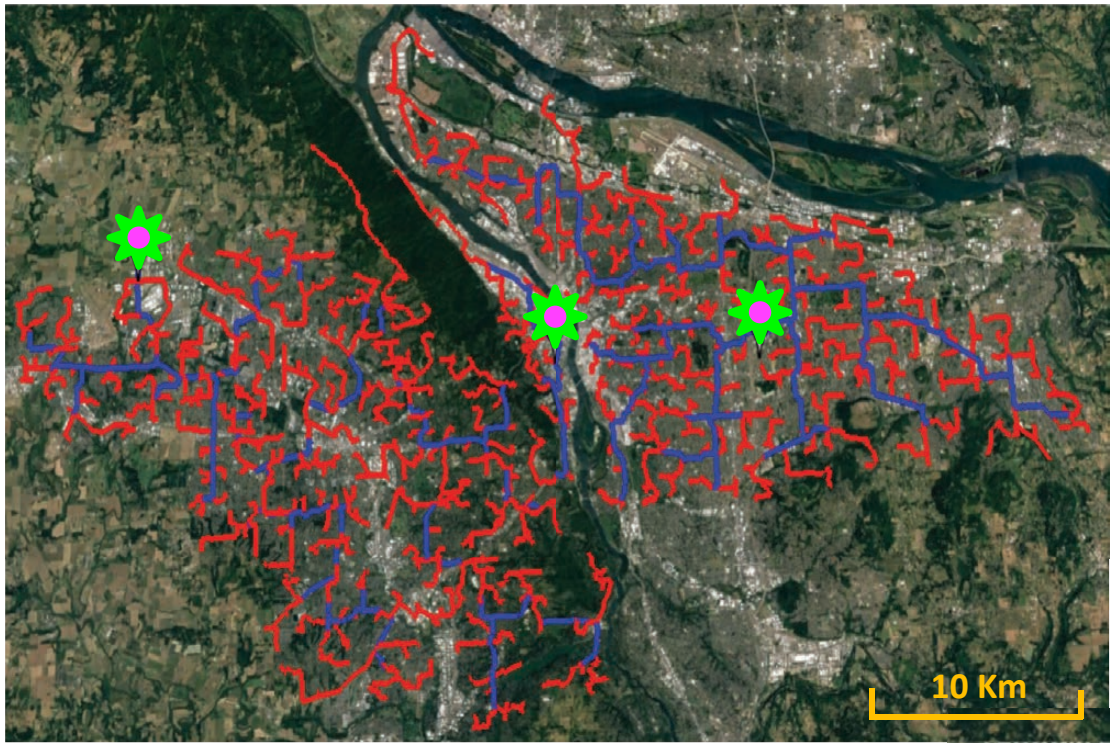
Scenario

Conventional PON: 16 COs



Large feeder

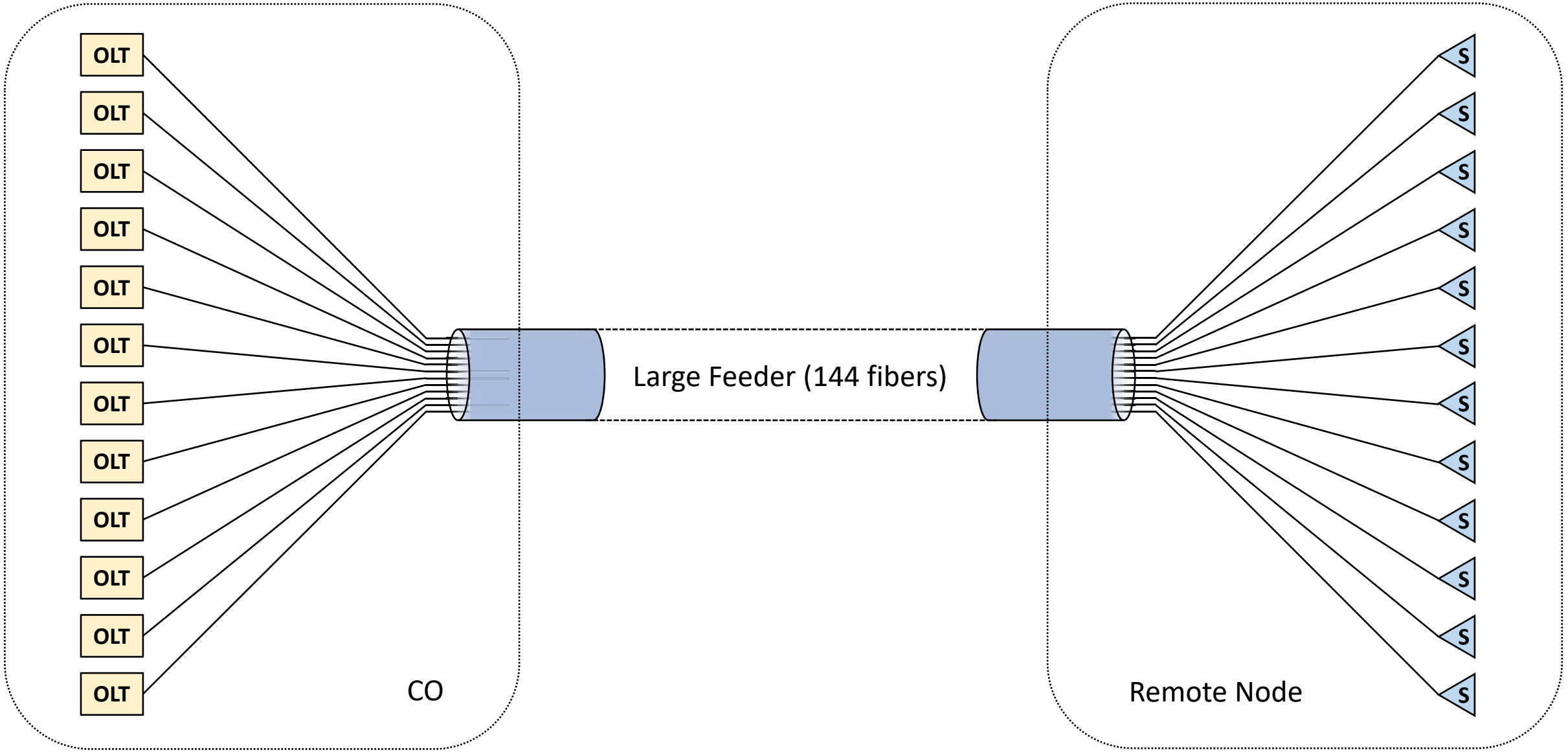
Super-PON: 3 COs



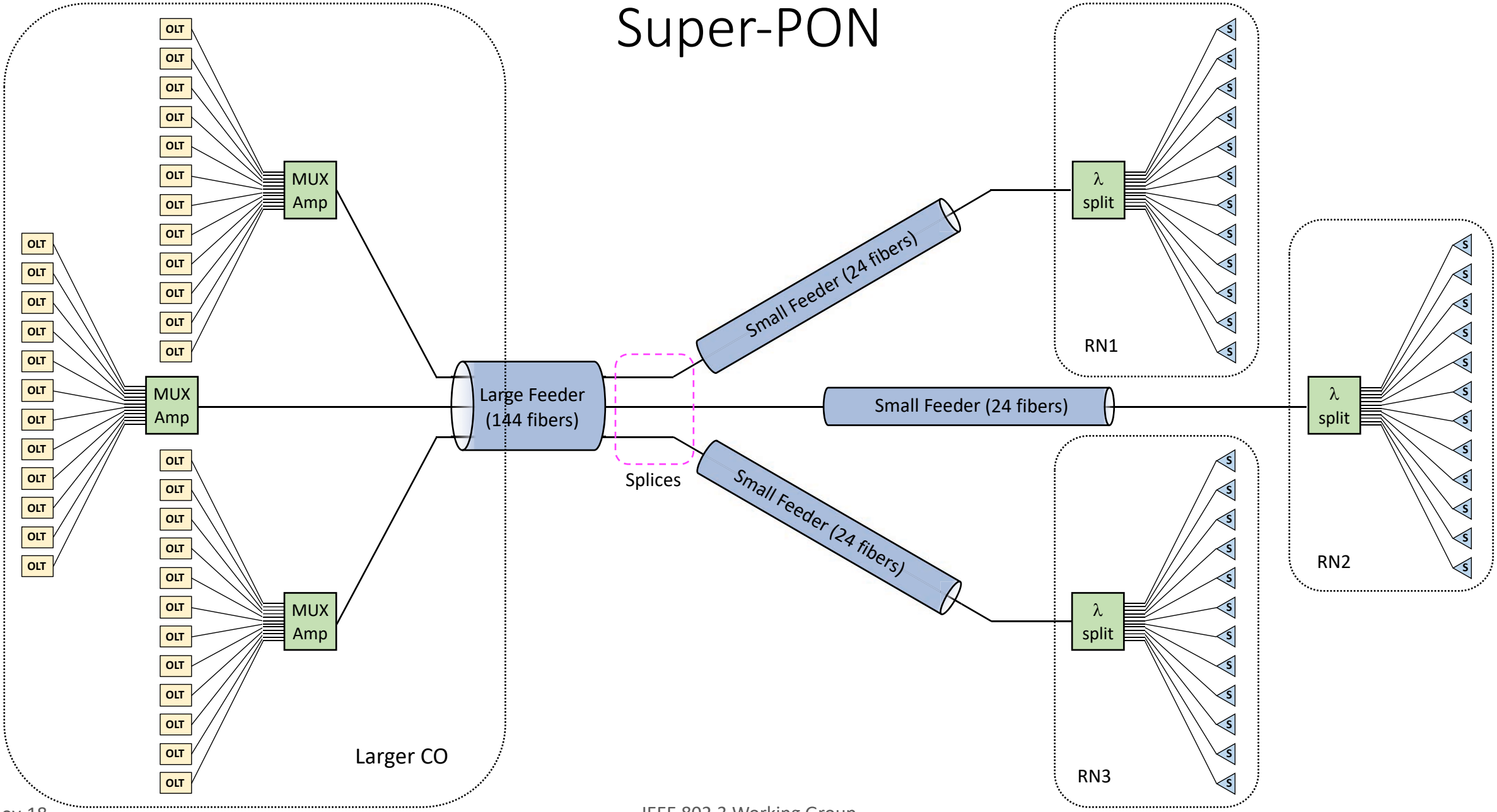
Large feeder

Small feeder

Conventional PON



Super-PON


OLT
MUX Amp
MUX Amp
MUX Amp
Large Feeder (144 fibers)
Splices
Small Feeder (24 fibers)
Small Feeder (24 fibers)
Small Feeder (24 fibers)
λ split
λ split
λ split
S
RN1
RN2
RN3
Larger CO

OSP Parameters

	Super-PON	Conventional PON
Households served	593668	593668
Large feeder footprint (m)	245839	829212
Small feeder footprint (m)	687173	0
Large feeder cable (m)	385791	2529404
Small feeder cable (m)	880589	0
Average distance between splices (m)	5000	5000
Central Offices	3	16

Assumption: small feeder cables installed with microtrenching techniques, Large feeder cables installed with conventional trenching techniques

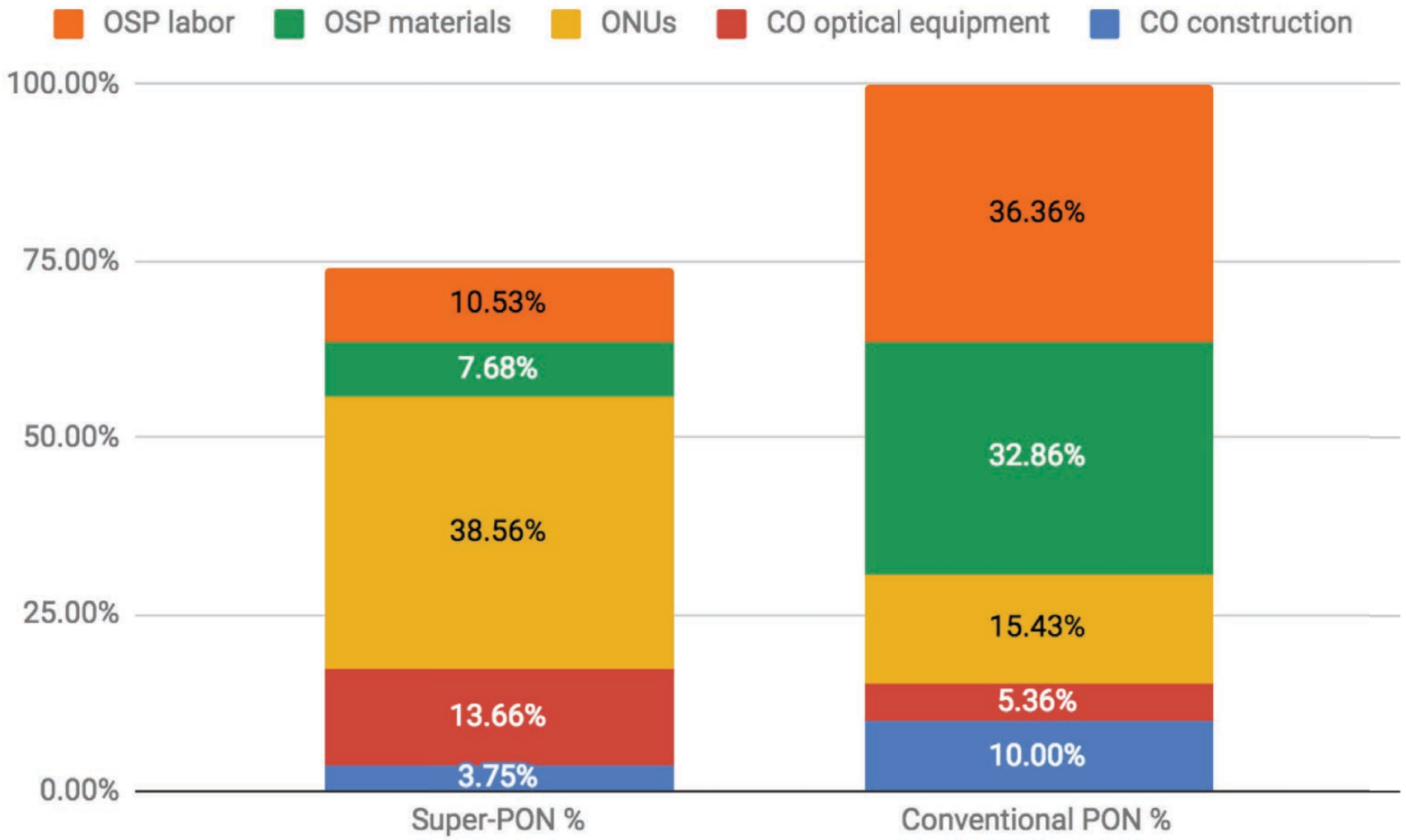
Equipment Parameters

	Super-PON	Conventional PON
Take rate	0.3	0.3
Power split ratio	64	64
Splitter utilization	0.75	0.75
Super-PON wavelengths	12	
Wavelength utilization	0.85	
OLT ports	12368	12368
MUX/Amplifiers	1212	
Wavelength Splitters	1212	
ONUs	178100	178100

Optics Assumptions

- Assume the cost of a Super-PON ONU to be ~2.5 times the cost of a 10G-PON ONU
  - Based on a Ovum report at OFC 2018 claiming the cost of an NG-PON2 ONU to be 2 to 2.5 times the cost of an XGS-PON ONU
- Assume the cost of Super-PON OLT optics to be ~25% more expensive than 10G-PON OLT optics
  - Non tunable
- Estimate the cost of the MUX/Amplifiers and of the Wavelength Splitters based on our experience
- Assume the construction cost of a larger Super-PON CO to be twice the construction cost of a conventional PON CO

Relative Costs based on US DoT Data



Conclusion

- A Super-PON solution appears to be economically feasible
- US DoT data available here:
  - https://www.itscosts.its.dot.gov/its/benecost.nsf/SubsystemCosts?ReadForm&Subsystem=Roadside+Telecommunications+(RS-TC)

Thank you