Integration of OMNeT++ Hybrid TDM/WDM-PON Models into INET Framework

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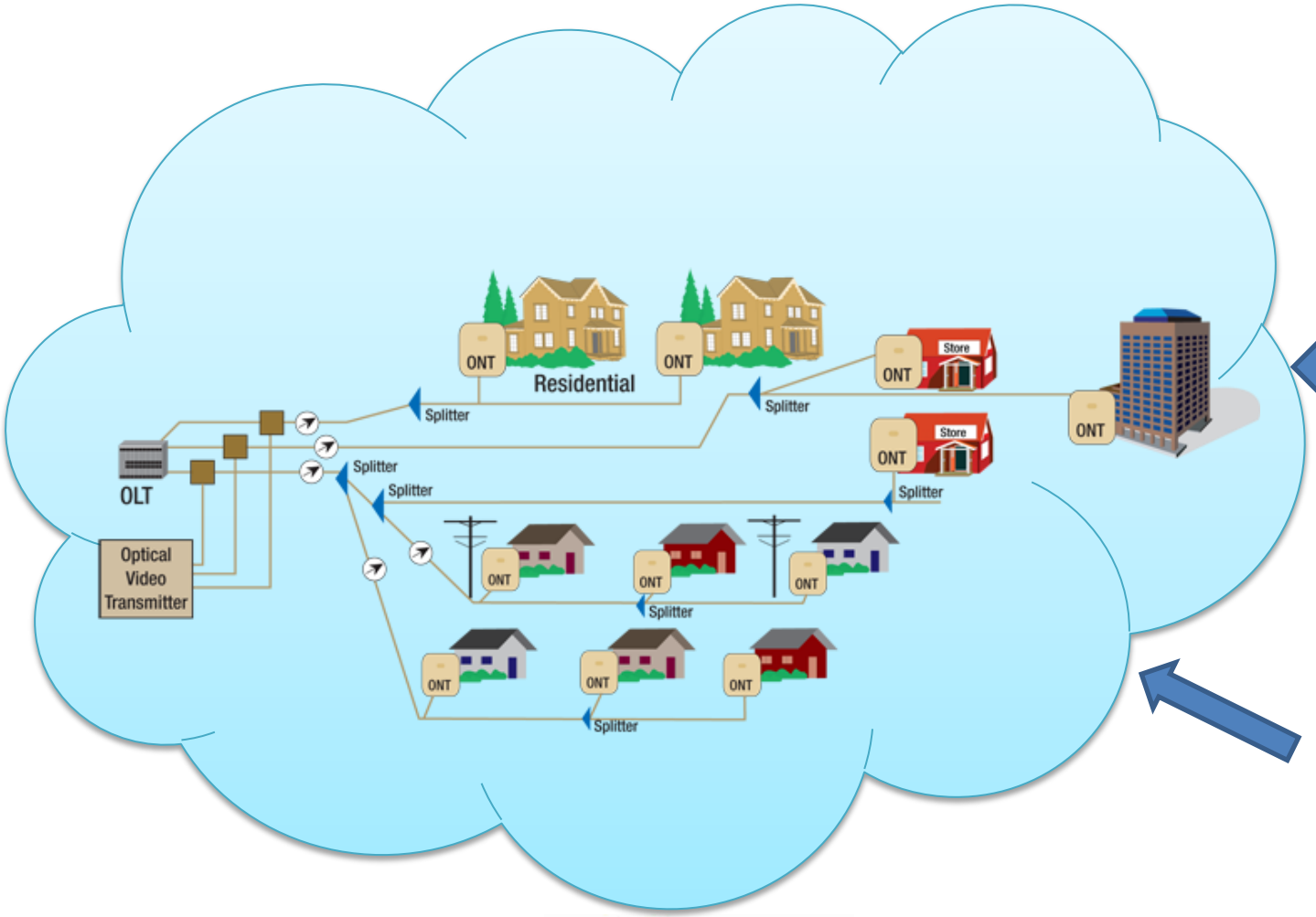
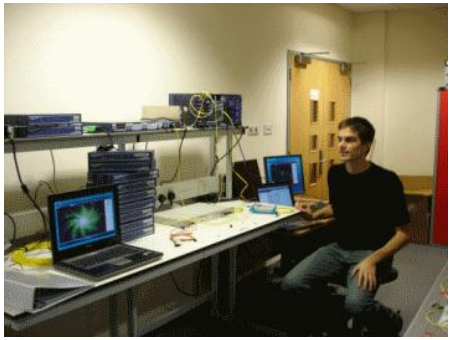
Virtual NGOA Test Bed



Linux HPC cluster with 22 nodes



1.25 Gb/s GPON test bed

amazon web services™

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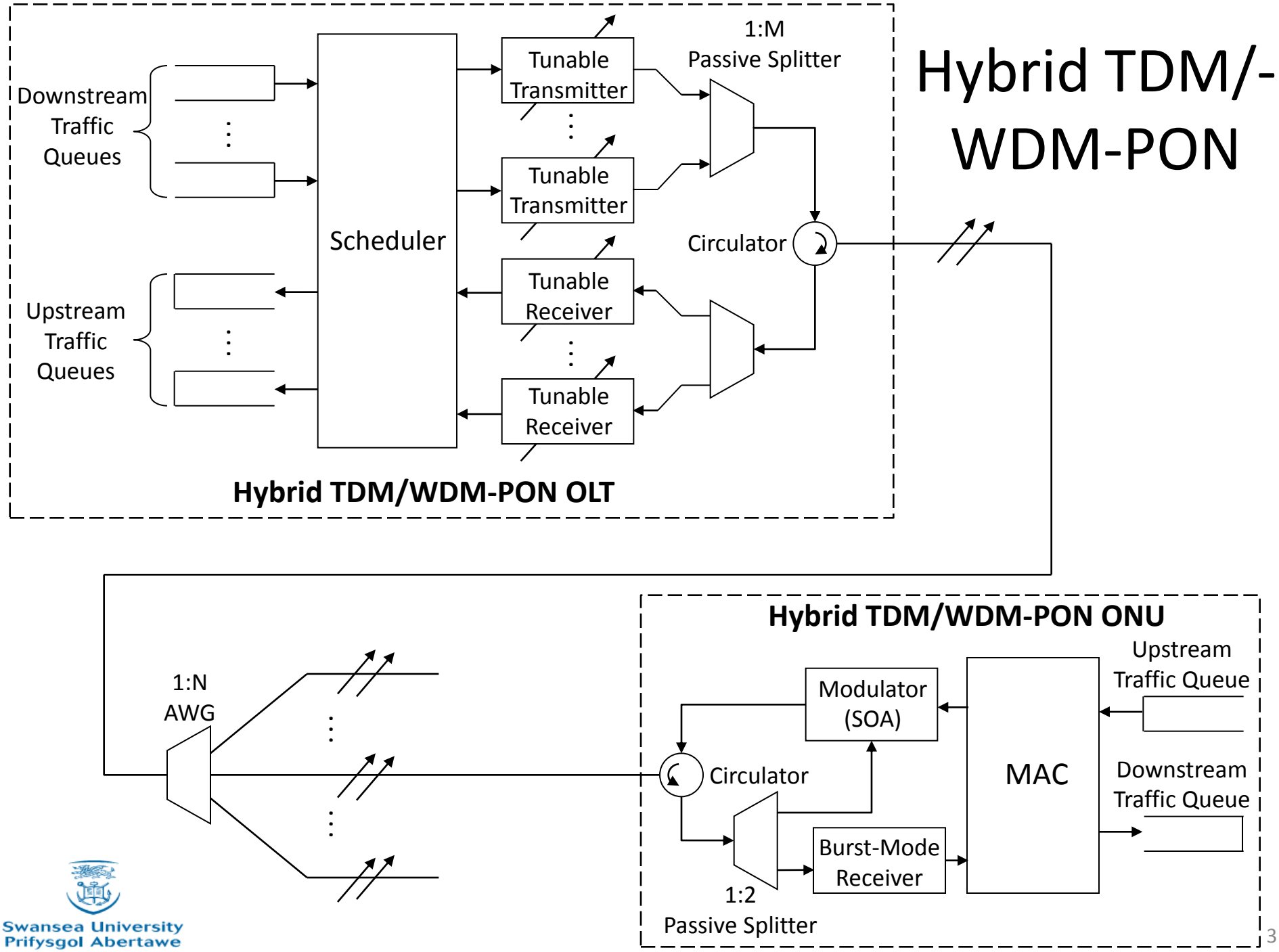
Motivation

- To develop a ***comparative analysis framework*** and ***supporting environment (virtual test bed)*** for next-generation optical access (NGOA) architectures based on user-perceived performances
  - Measuring end-to-end, user-level experience of performance (i.e., QoE)
  - Traffic generation based on user behaviour models

Hybrid TDM/-WDM-PON



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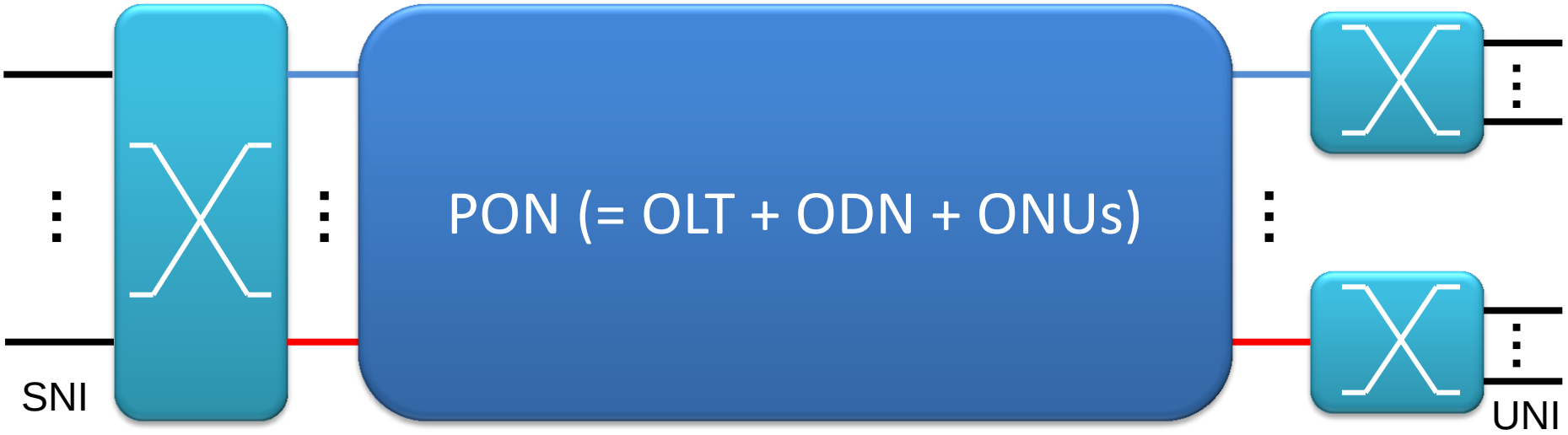
INET Integration

- Switching at OLT and ONU
- Optical layer modelling
- ONU Discovery
- Control Frames

Switching at OLT and ONU - 1

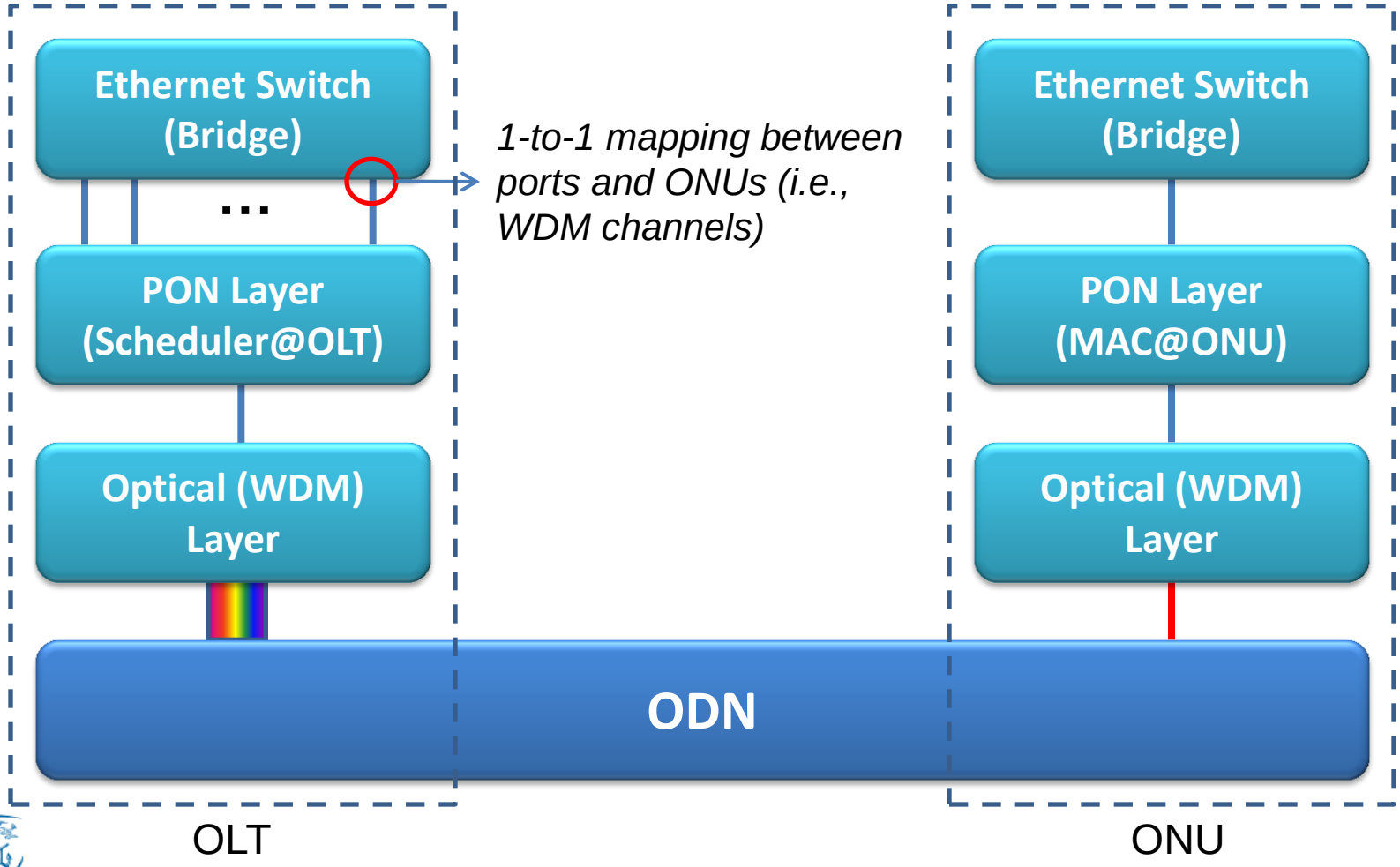
- Mapping between ***Ethernet*** and ***PON*** addresses
  - PON address in hybrid PON: WDM channel index
- Based on point-to-point model of underlying PON
  - No support of broadcasting/multicasting at the PON level



PON as a point-to-point network

Switching at OLT and ONU – 2

- Layered diagram of hybrid TDM/WDM-PON



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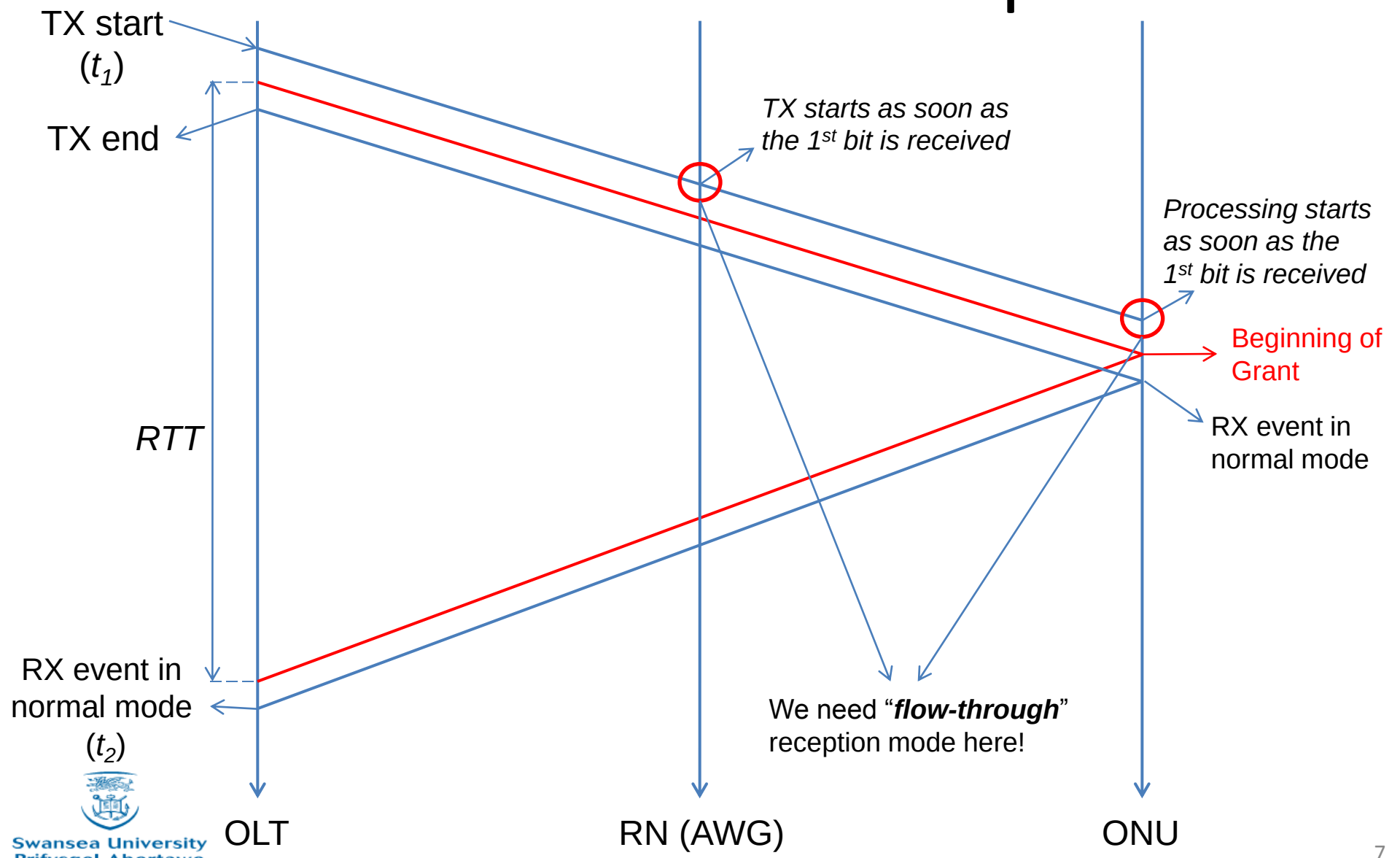
Optical Layer Modelling – Transmission and Reception



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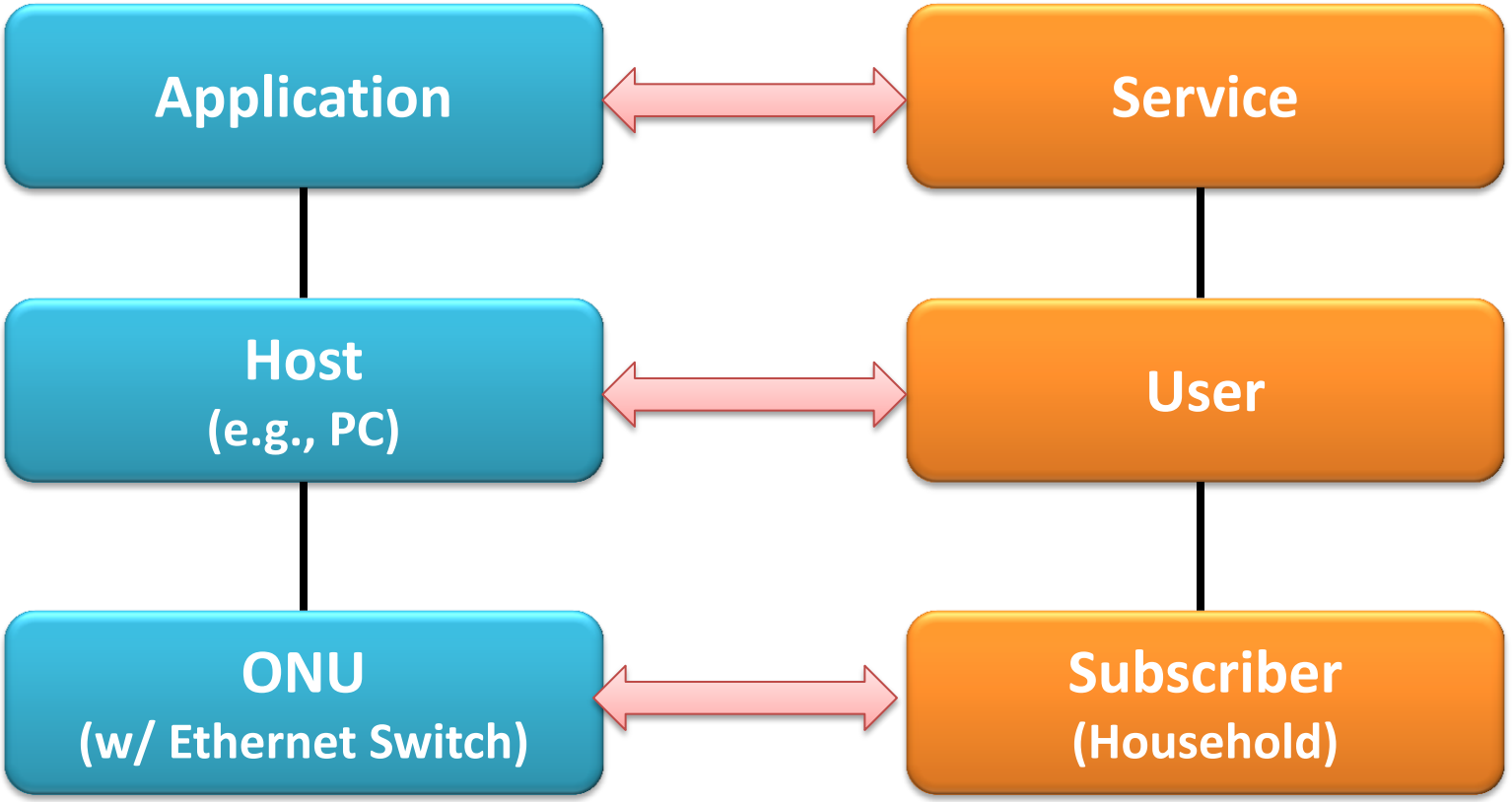
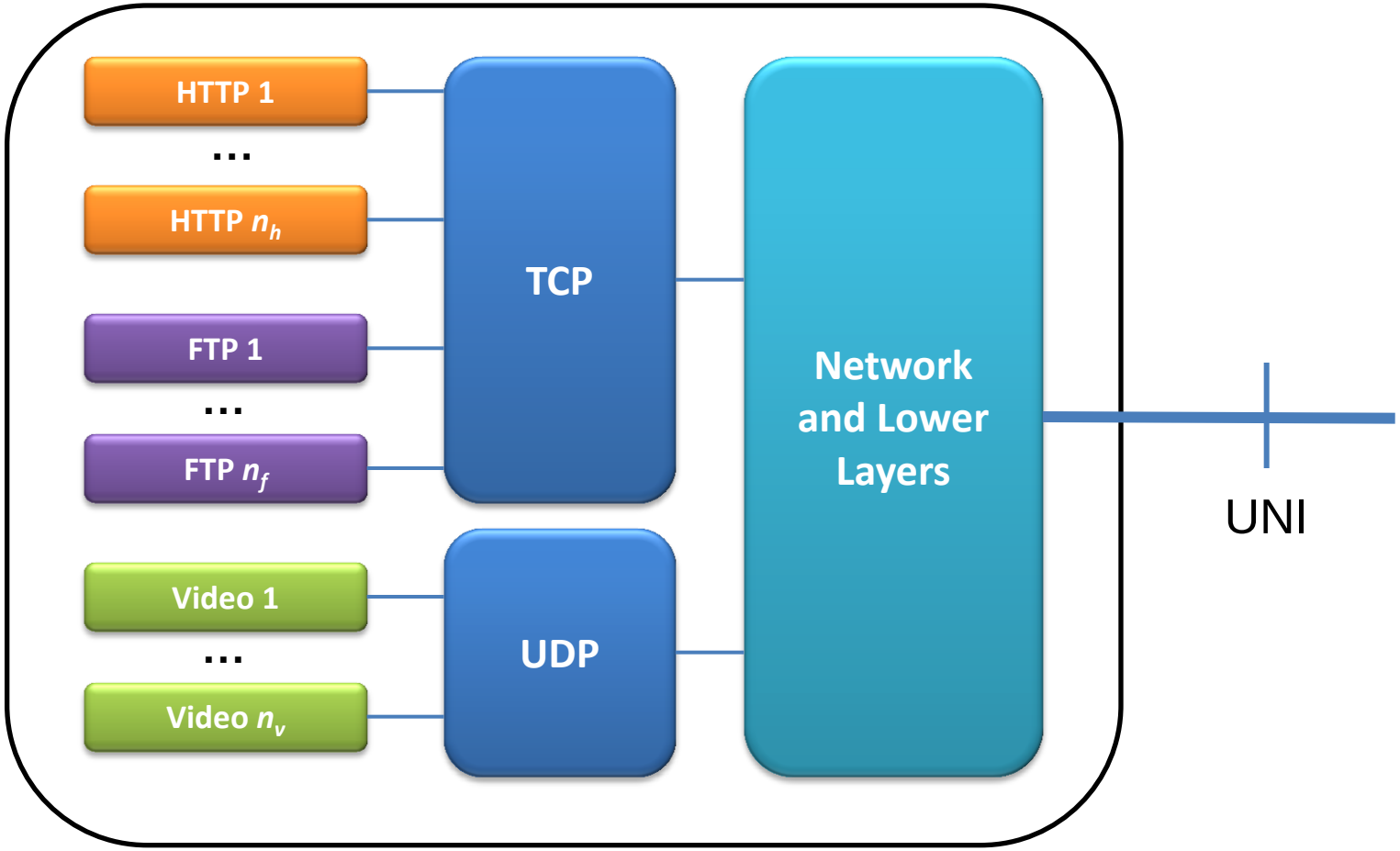
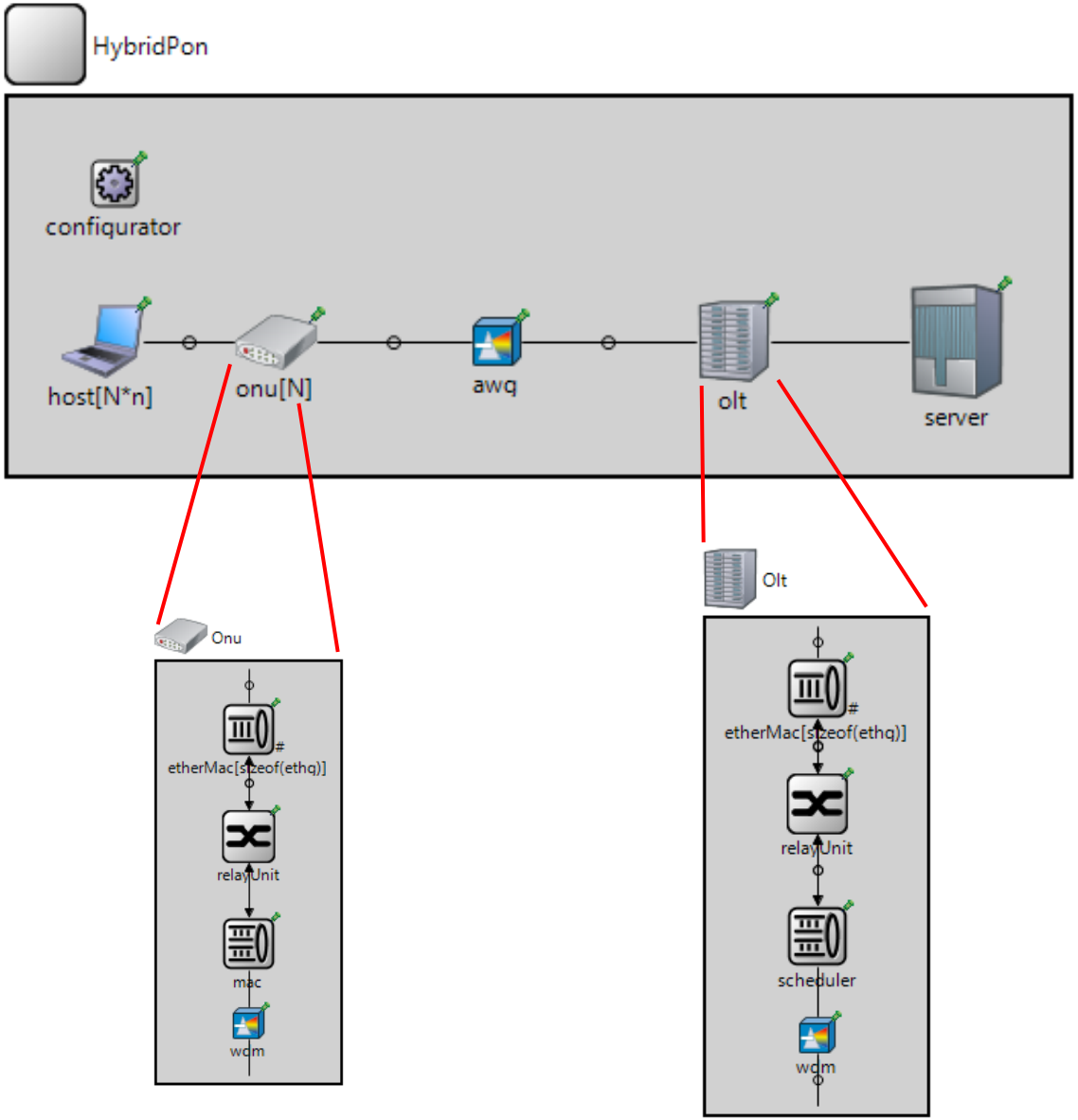
Hierarchical Model Construction



Overview of Host (User) Node



Implemented Modules



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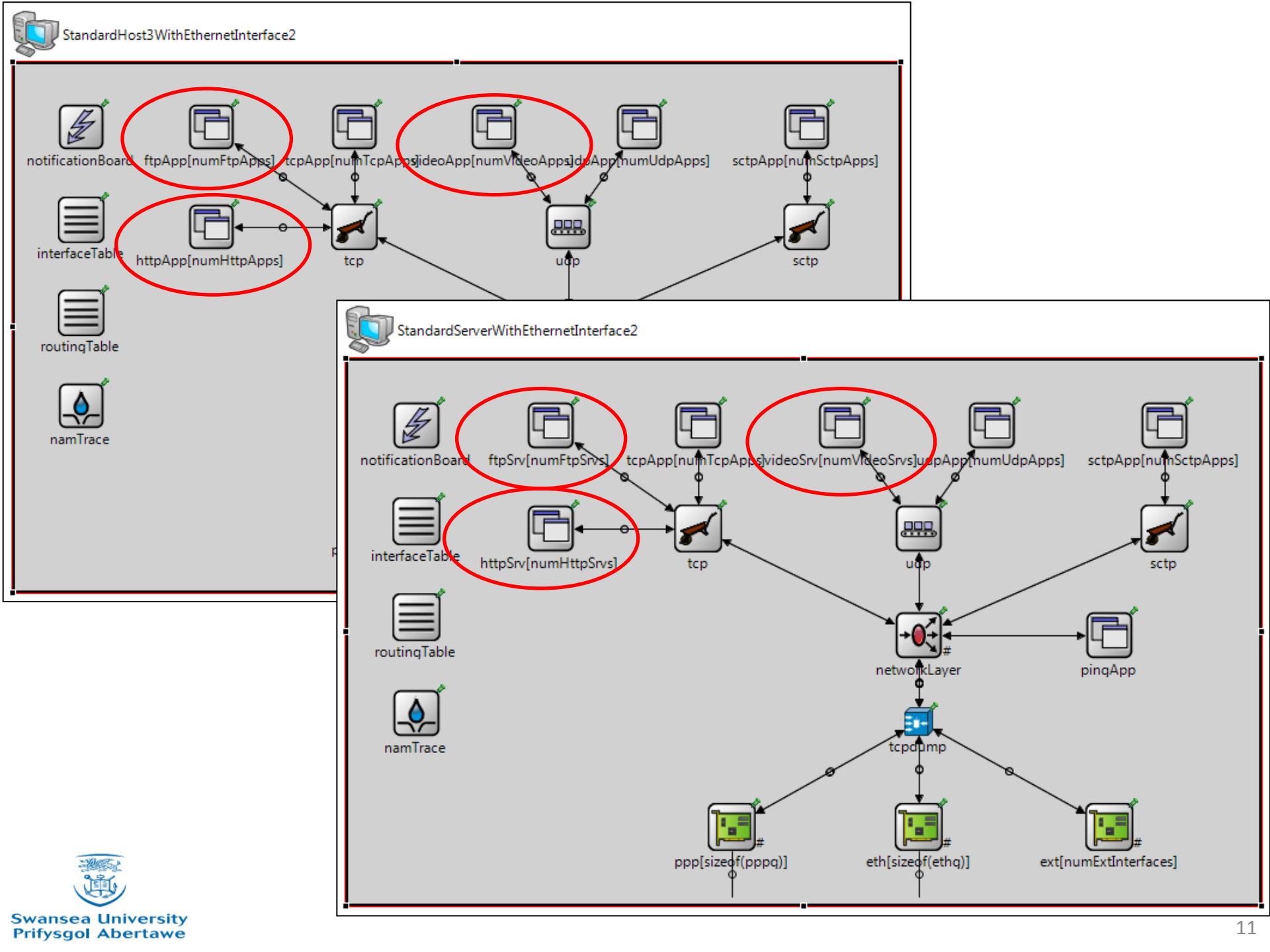

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Streaming Video Traffic Model

- Based on H.264/AVC video traces
  - e.g. “Terminator 2” VBR clip from ASU Video Trace Library
    - Duration: ~10 min
    - Frame Size: HD 1280x720p
    - Mean frame bit rate: 28.6 Mbit/s
- Interface with OMNeT++/INET through “UDPVideoStream{Svr,Cli}WithTrace” modules:
  - Performance metrics:
    - ***Decodable frame rate (perceived quality metric)***
    - Packet end-to-end delay (vector)
    - Packet loss rate
    - Frame loss rate

For More Information

- INET-HNRL
  - http://kyeongsoo.github.com/inet-hnrl/

- Virtual Test Bed for Next-Generation Optical Access
  - http://iat-hnrl.swan.ac.uk/projects/virtual_ngoa_testbed.html