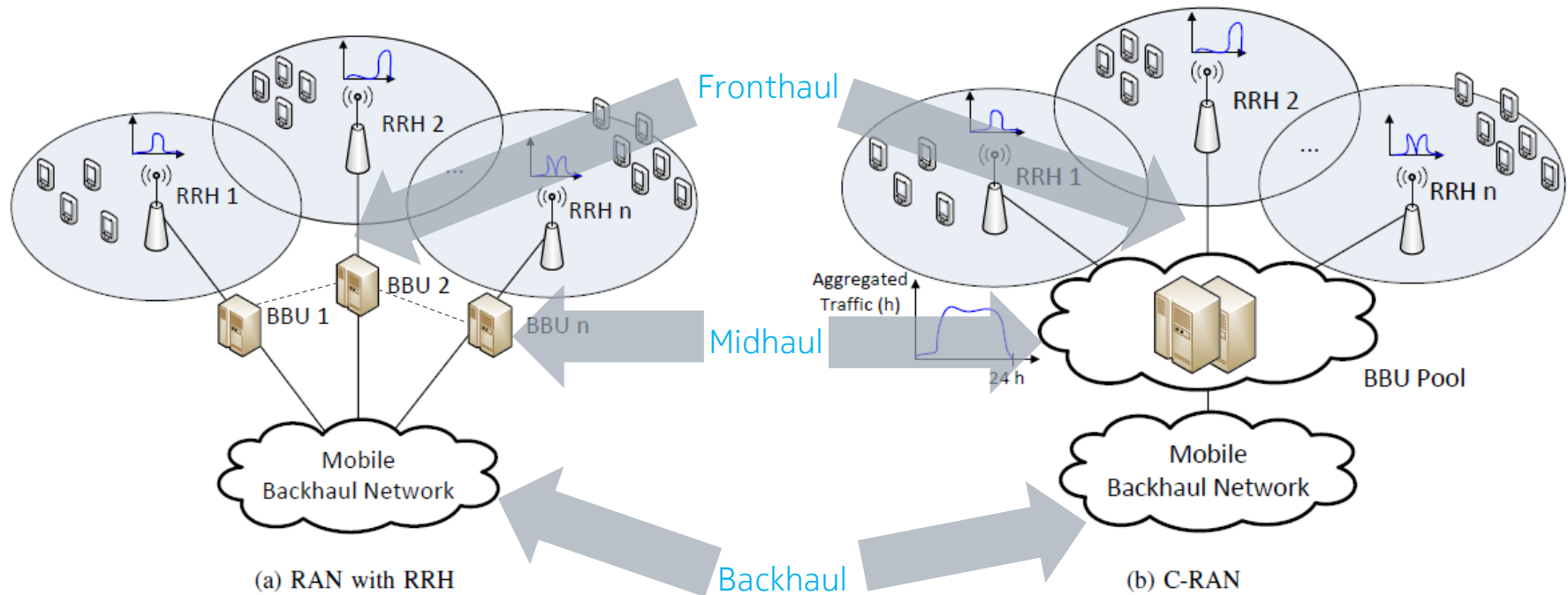


# Using P4 for converged and programmable XHaul in mobile RAN

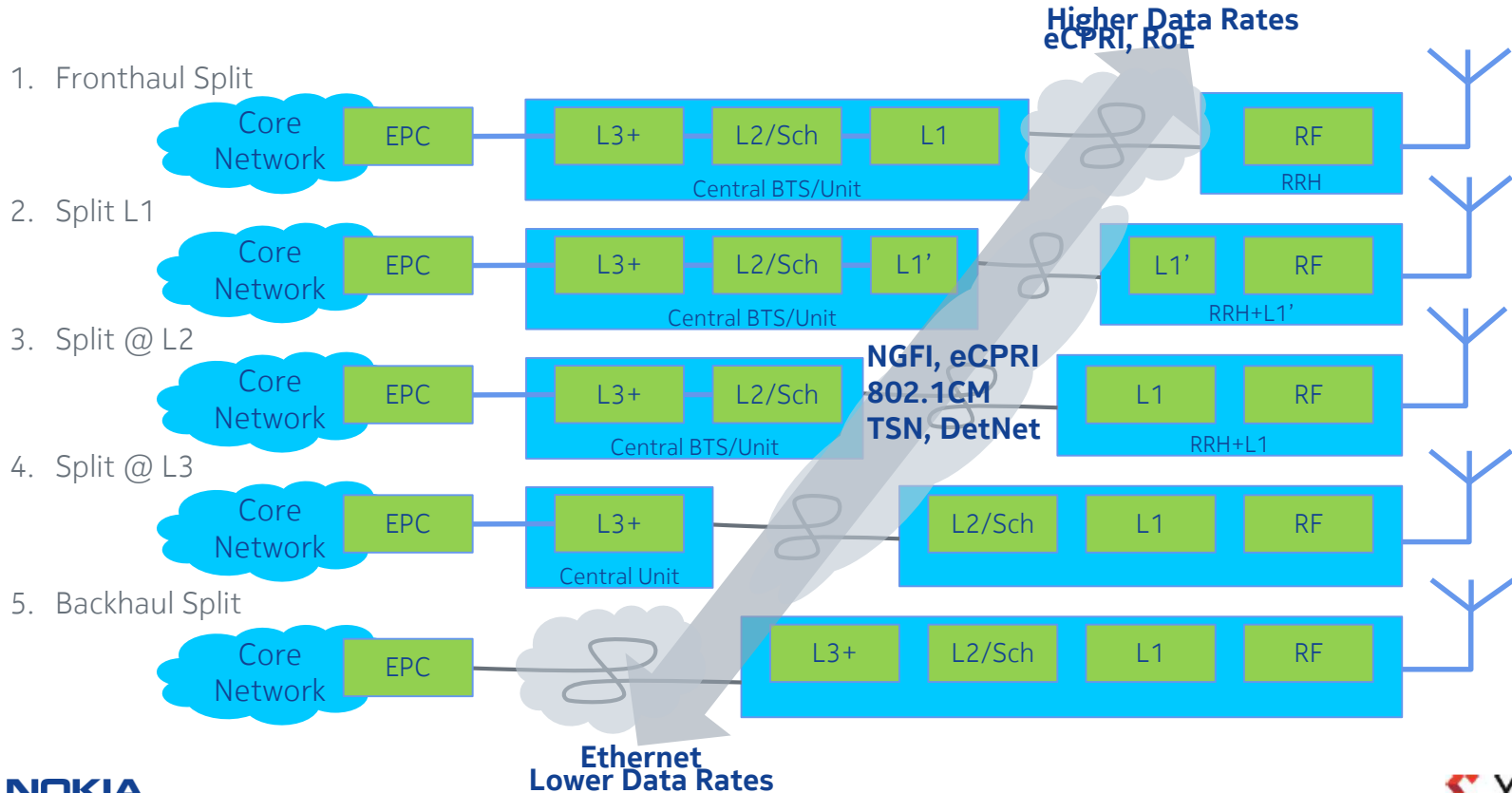
James Yu, Nokia

Gordon Brebner, Xilinx

# XHaul Overview



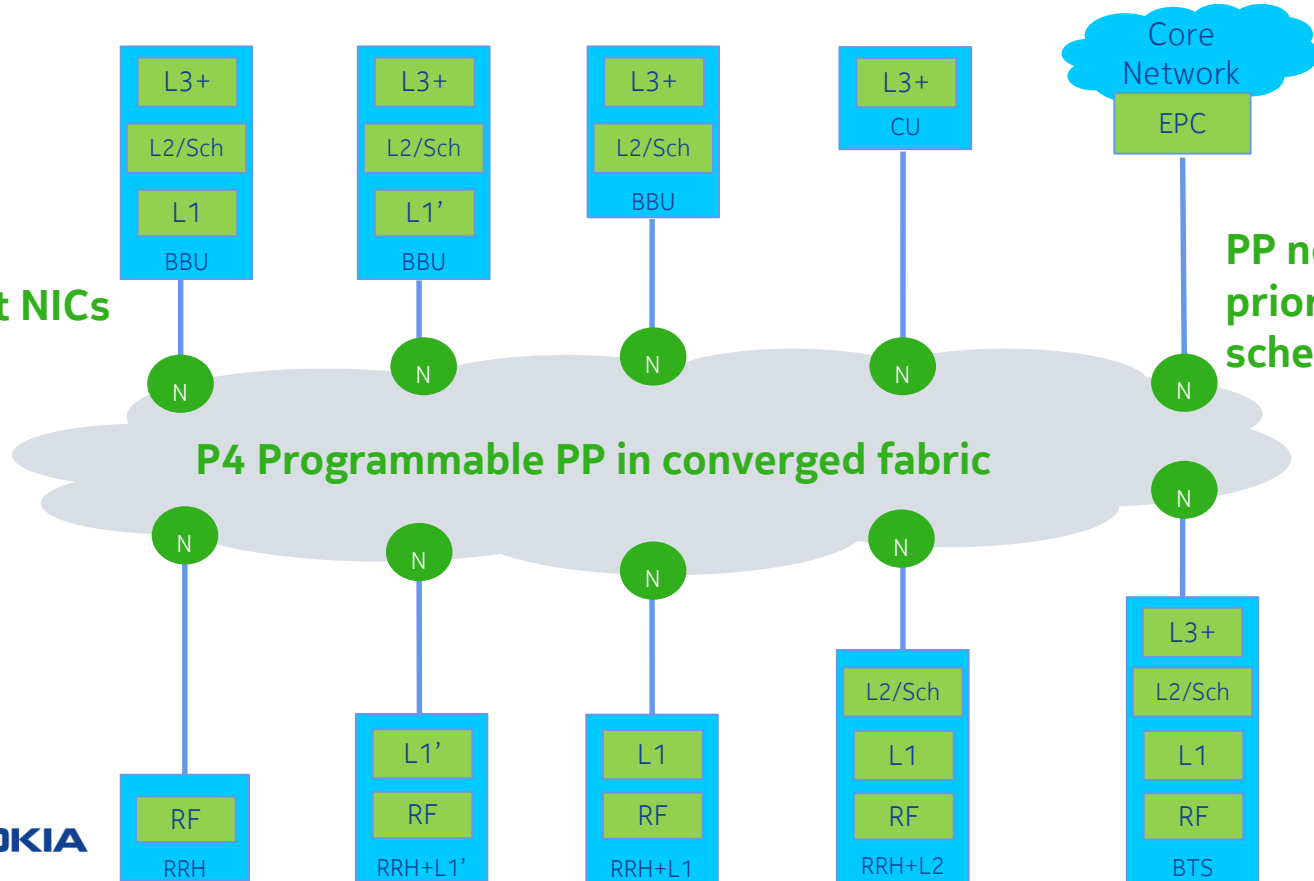
# Converged XHaul Challenges



# P4 Converged Solution

Also at NICs

PP not just protocols, but priority, classification, scheduling, and more...



# What Does P4 Solve for X-Haul?

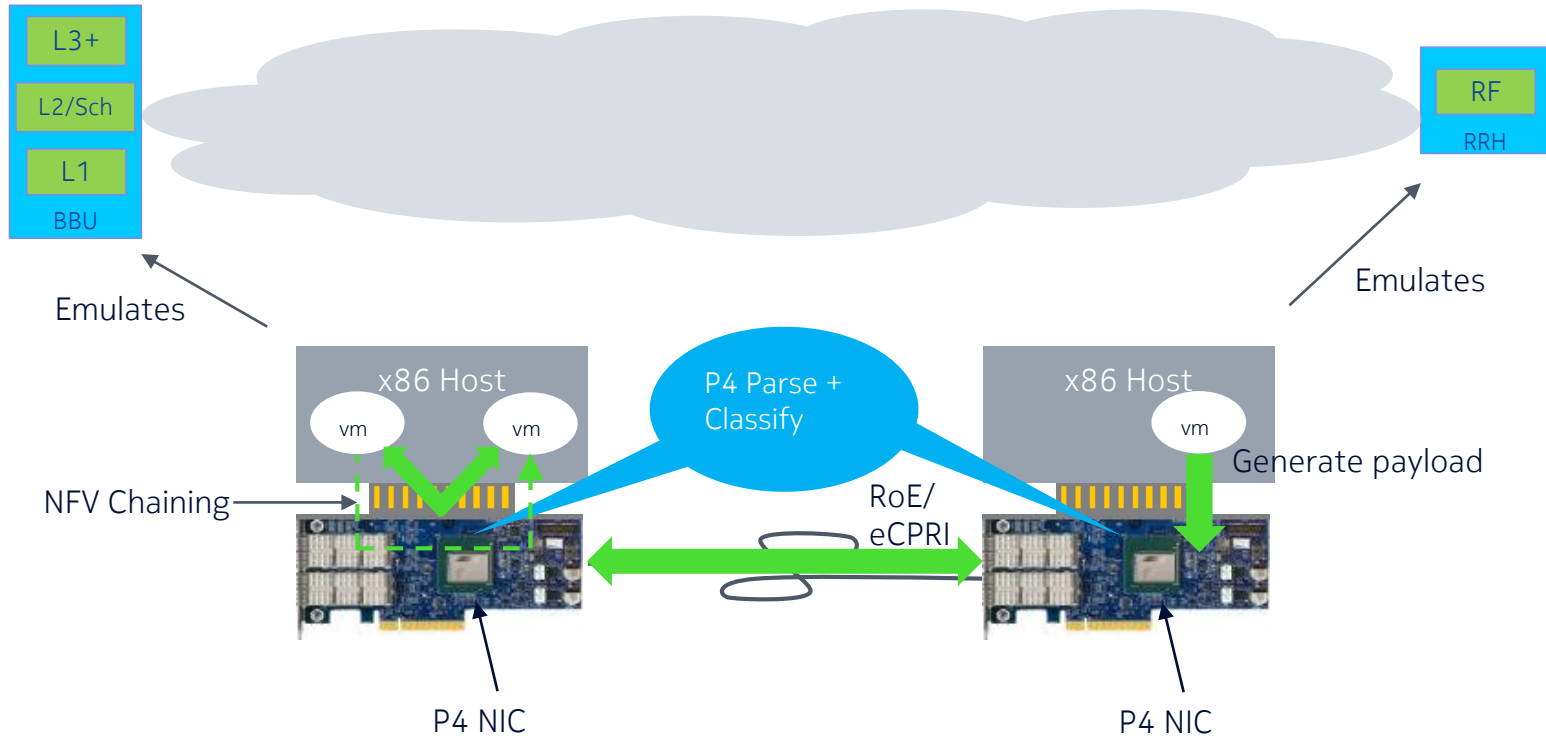
Issues	Resolution Using P4
No single right solution. Multiple options with diverse requirements.	Single converged HW but customizable solutions using programmable P4 SW
How to inter-operate and upgrade?	Enhance NIC + fabric to inter-operate with SW upgrade.
Silicon follows standardization, which is far away	No need to wait. Evolve with standards and new protocols as they emerge.

Churns

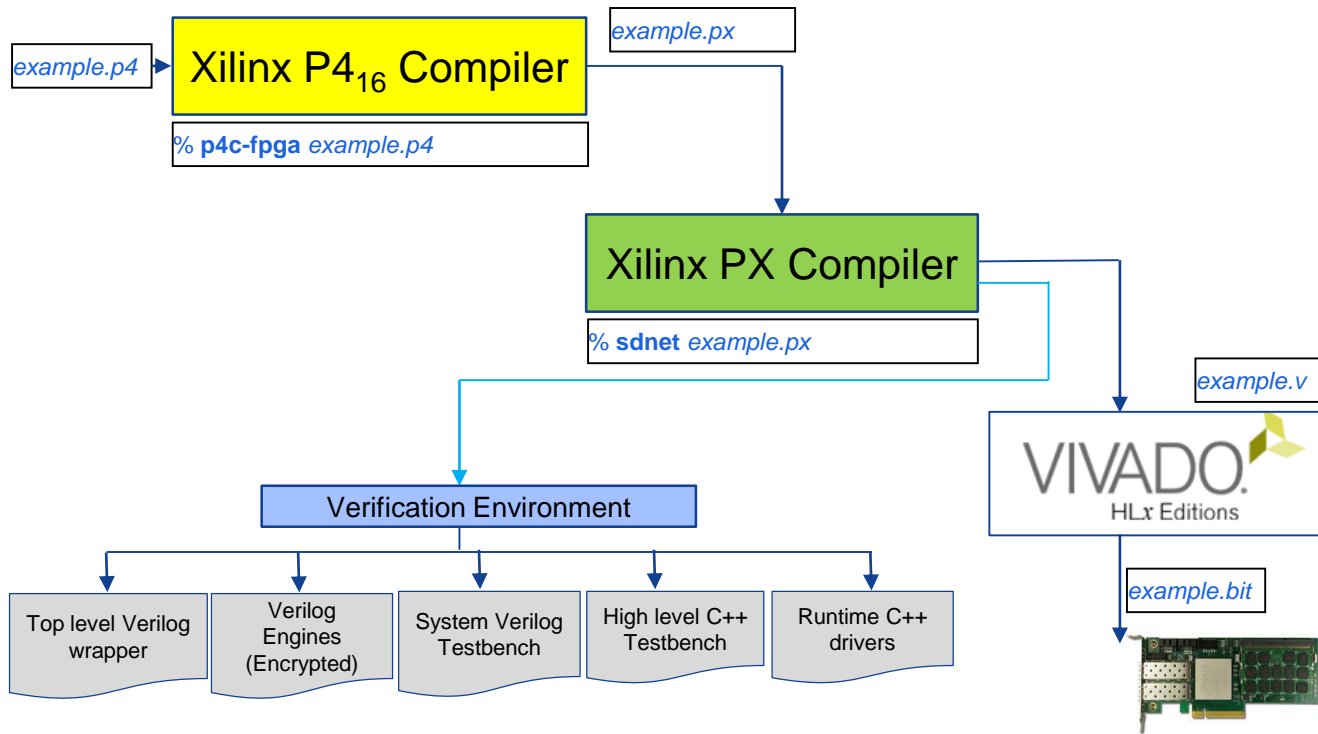


Good for using P4

# P4 XHaul PoC (RRH to BBU)



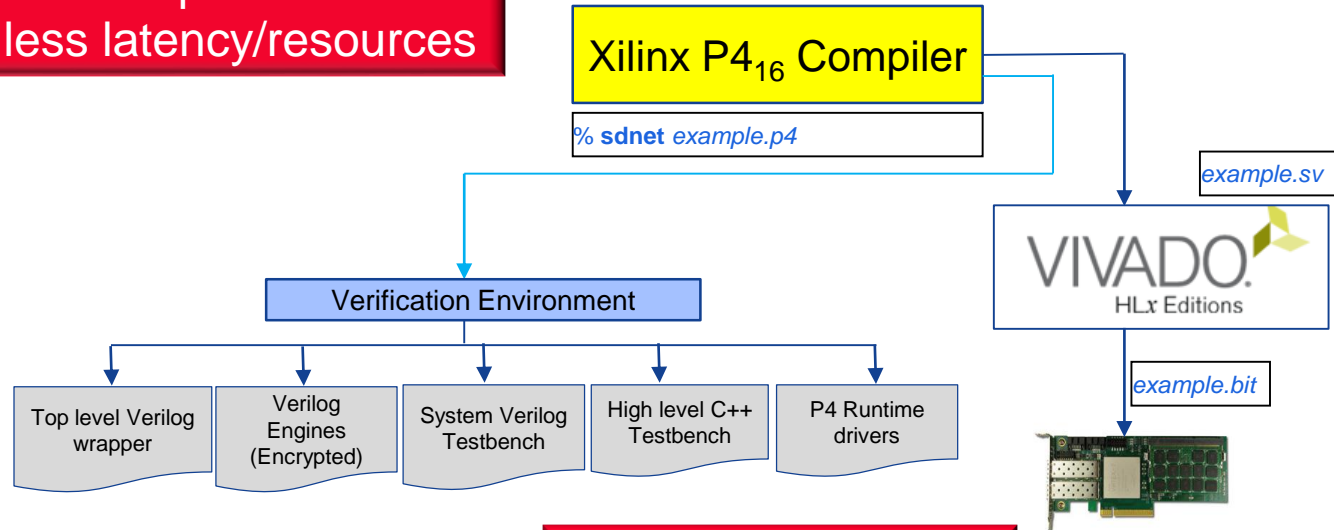
# Current Xilinx P4 compilation ([www.xilinx.com/sdnet](http://www.xilinx.com/sdnet))



# Next-generation Xilinx P4-SDNet compilation

Prototyped now, scheduled for release in November 2018

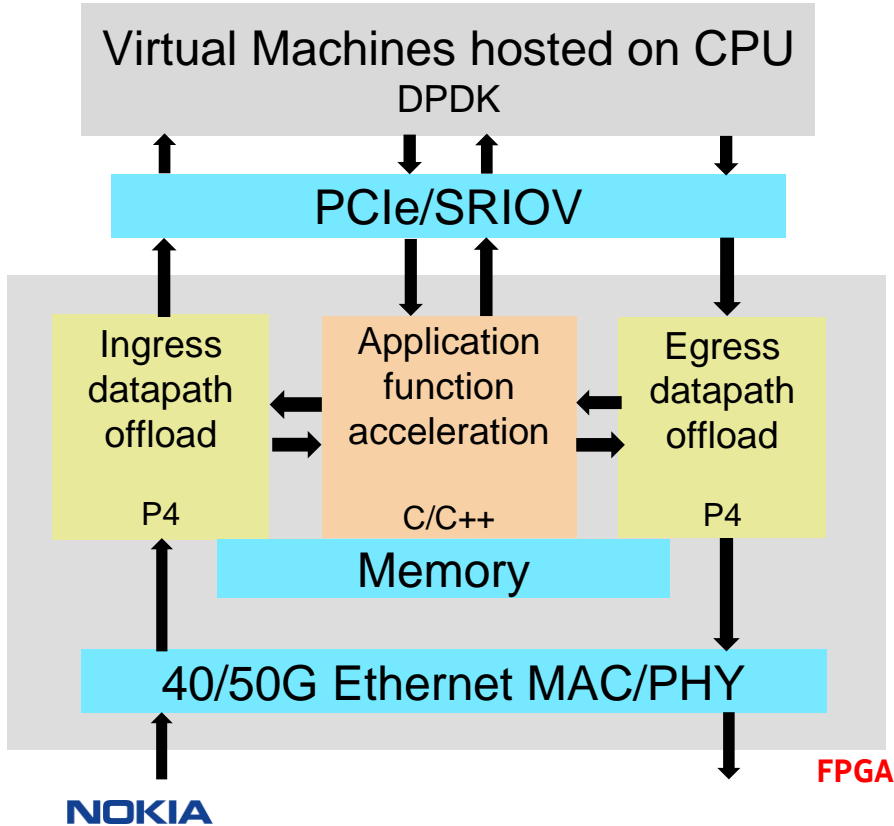
Optimization of data path:  
Native P4 compilation  
>50% less latency/resources



Open standard API:  
P4 Runtime



# Xilinx Labs “Type 1, 2 and 3 NIC” prototype



	Description	Example features
<b>Type 1</b>	Basic Connectivity NIC	<ul style="list-style-type: none"> <li>Basic offloads (CHKS, LSO, RSS)</li> <li>Single Root I/O Virtualization</li> <li>Tunnel offloads (VXLAN, GRE)</li> </ul>
<b>Type 2</b>	SmartNIC for Network Acceleration	<ul style="list-style-type: none"> <li>Encryption/Decryption (IPSec)</li> <li>Virtual Switch offload (OVS)</li> <li>Programmable tunnel types</li> </ul>
<b>Type 3</b>	SmartNIC for Network + Compute Acceleration	<ul style="list-style-type: none"> <li>Inline Machine Learning</li> <li>Inline Transcoding for Video</li> <li>Database Analytics</li> </ul>

# Summary and Suggestions

- P4 for RAN XHaul a good fit because of churns:
  - Multiple options, requirements and standardization work
  - Need HW before standardization
  - Convergence for economy of scale and operational efficiency
- Working PoC between RRH and BBU with Xilinx P4-programmed SmartNIC
- Suggestions for P4 community:
  - Support PP capability needs identified in emerging TSN and other work
  - NICs just as important as switches, so P4 NIC model as a future architecture?