

TSN INDUSTRIAL DEMO SHOW

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Senior Software Engineer

SEP 2021



SECURE CONNECTIONS
FOR A SMARTER WORLD

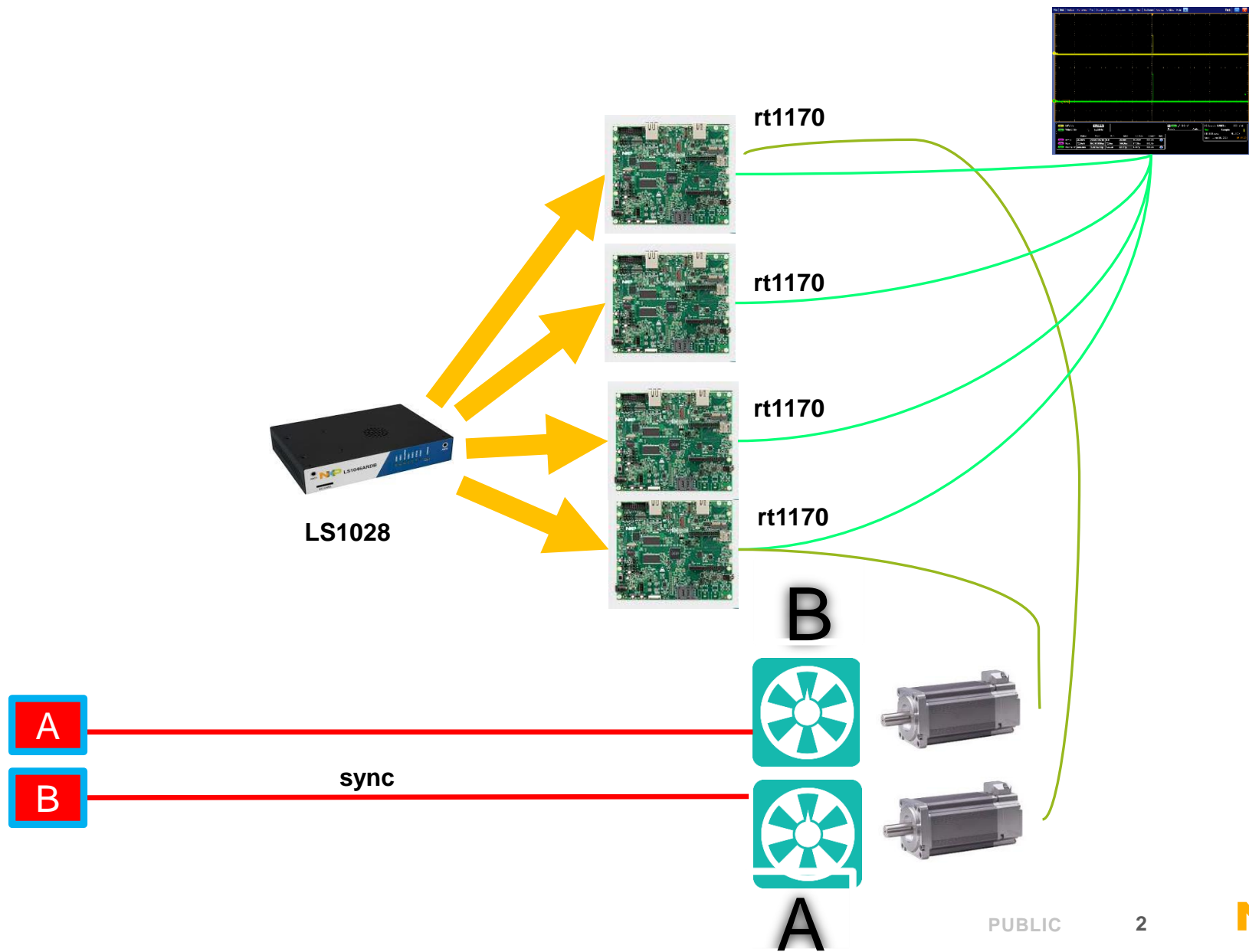
PUBLIC

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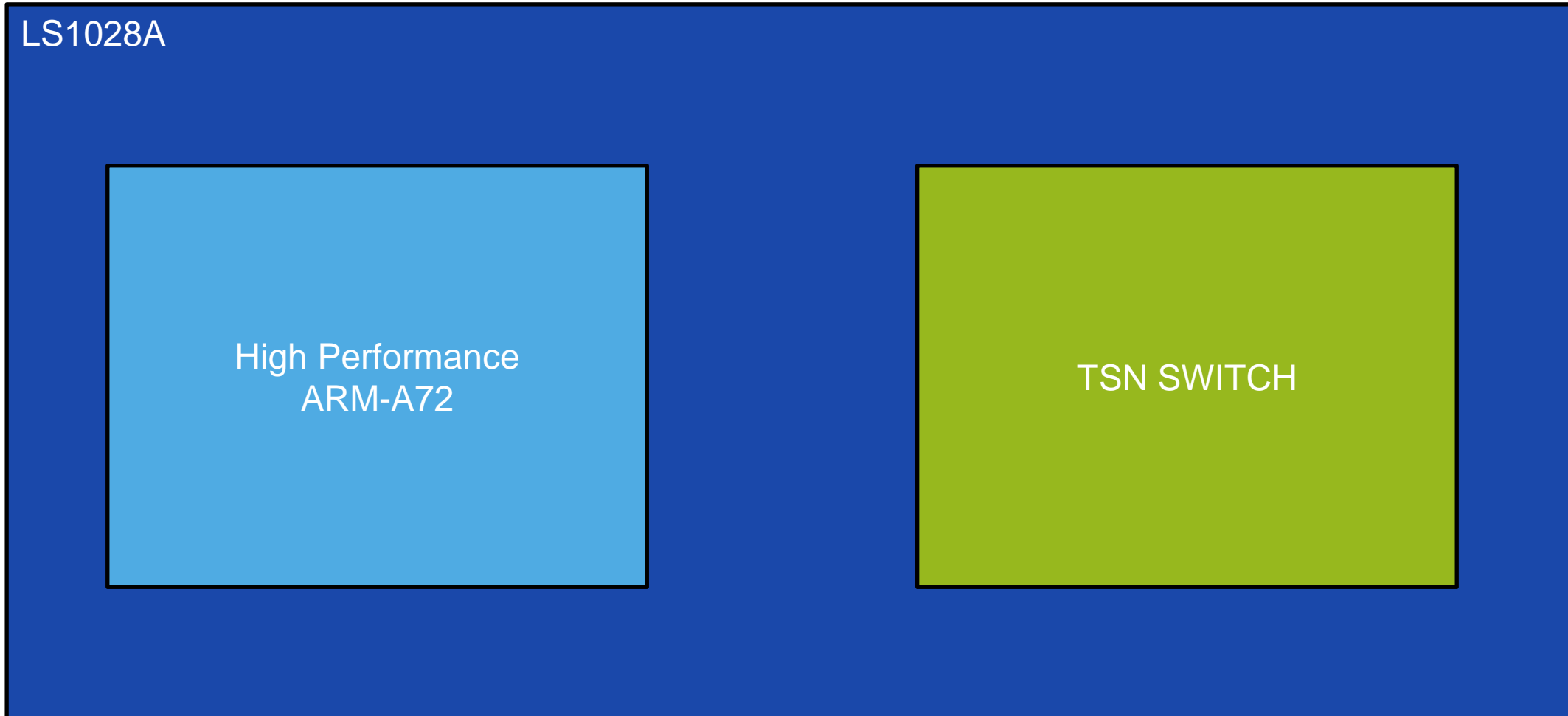


MULTI AXIS DEMO

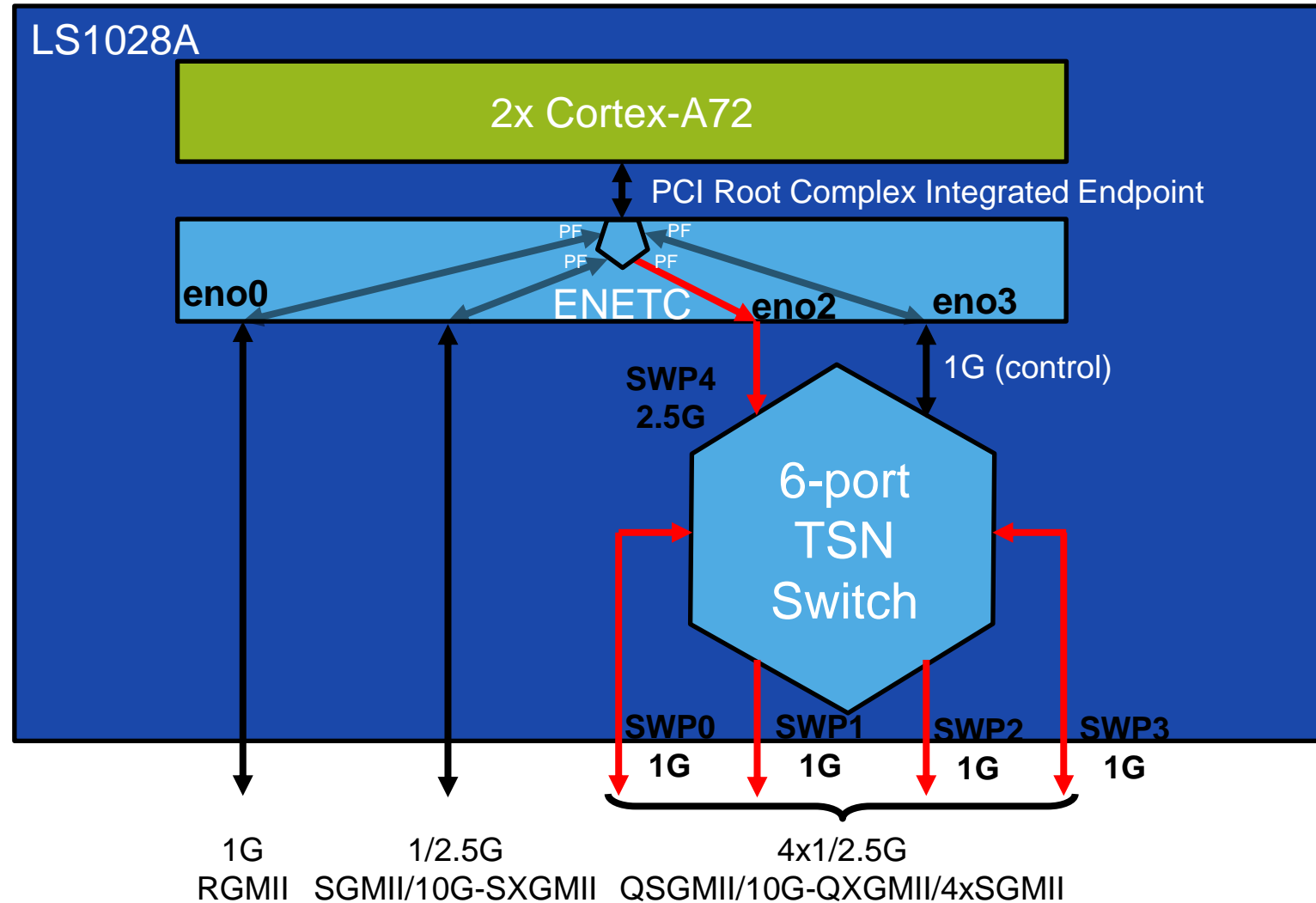
- Features Show:
 - 1588v2 sync
 - TSN Qbv
 - Real time performance



- ARM-A72 + TSN switch

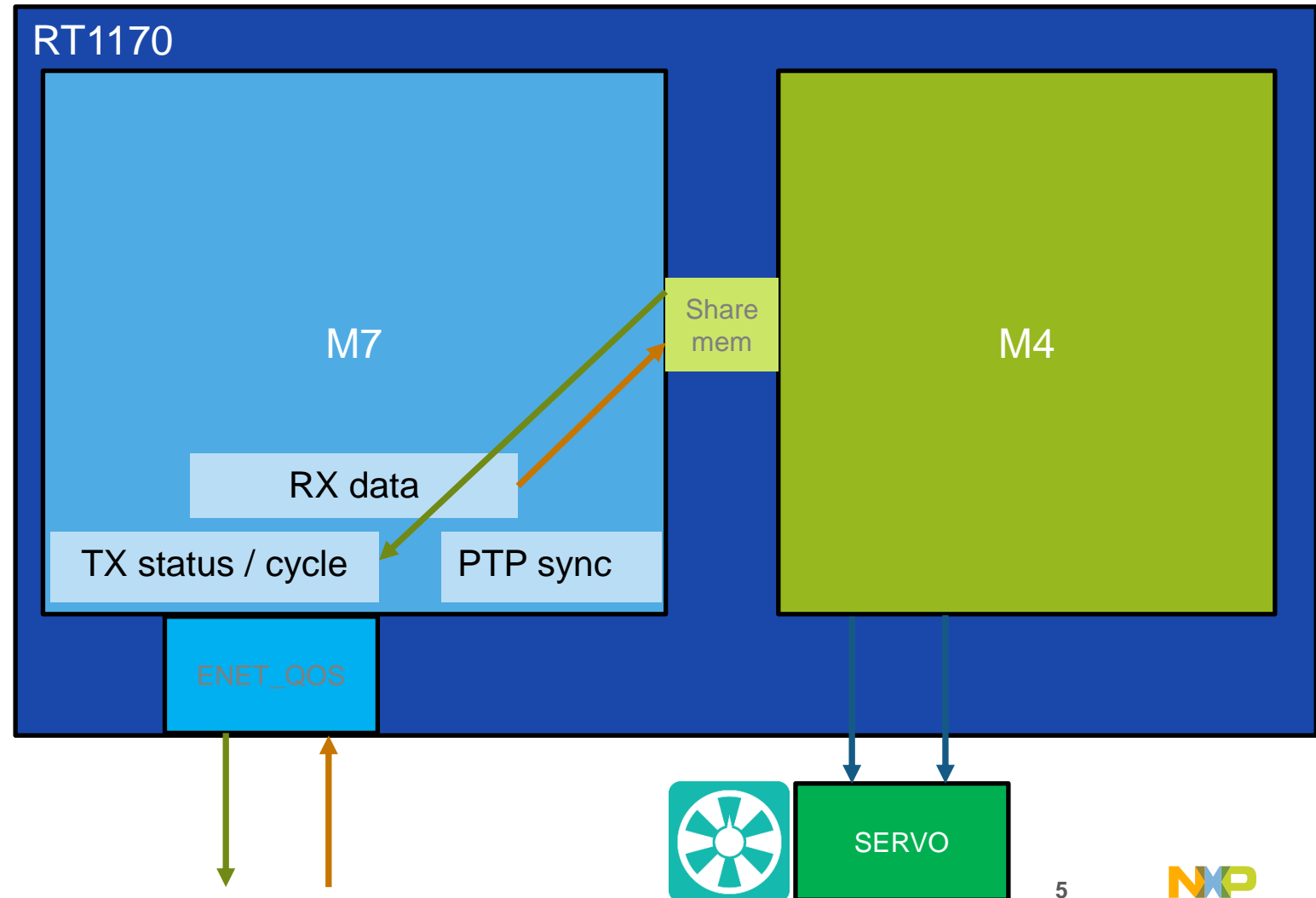


- CPU A72 as controller
- Enable internal SWP4
- ENO2 links to SWP4/2.5G port as data pass
- ENO3/1G port links to switch as switch control path

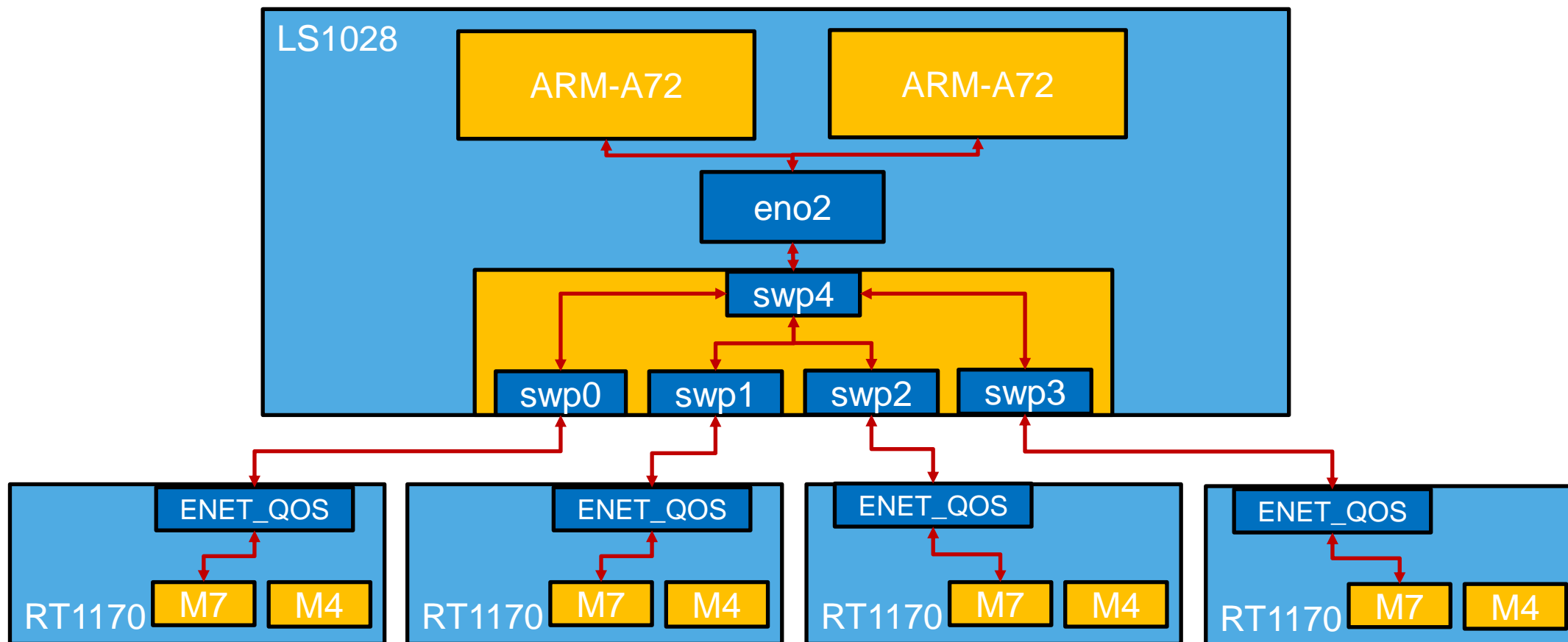


RT1170

- M7 for ethernet rx/tx
- Communicate with M4
- M4 for servo control
- Share memory for M4/M7 communication
- 40us cycle pulse for servo

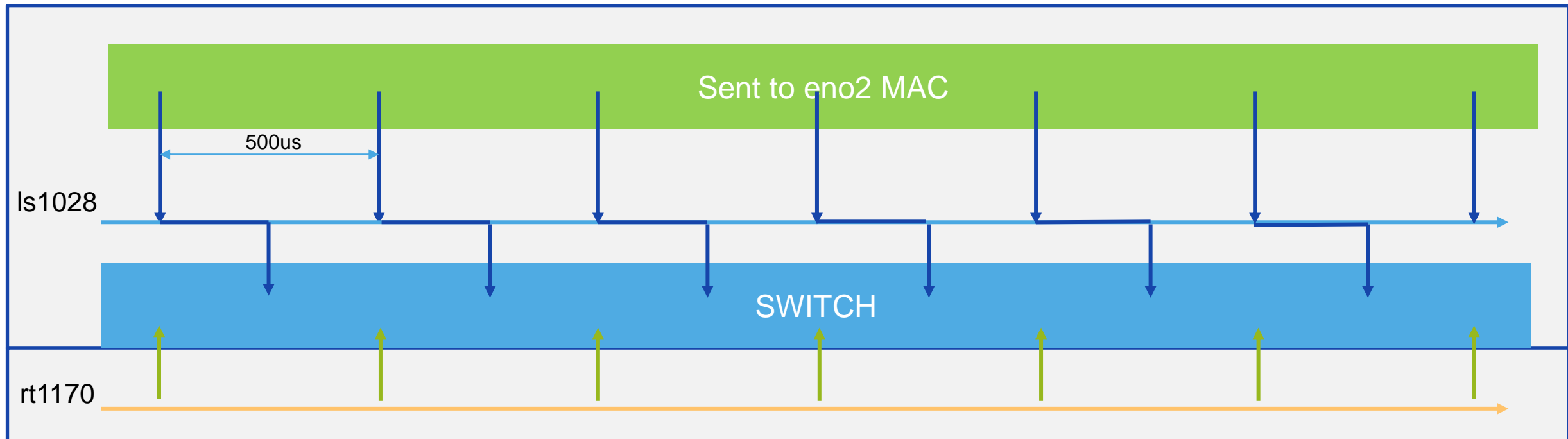


FRAME FLOW



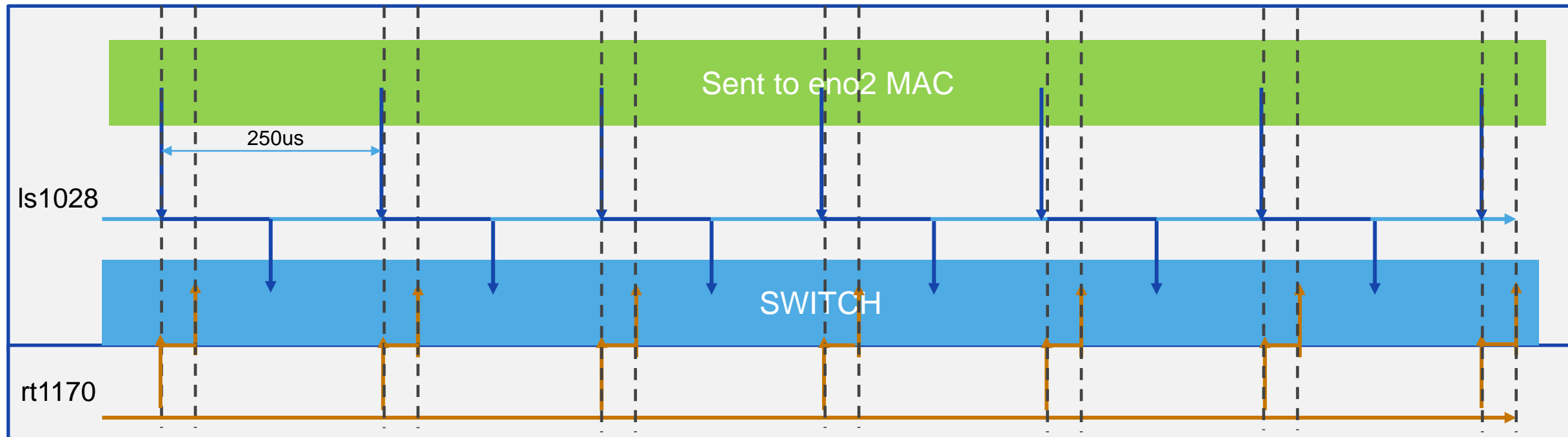
CYCLE EXPLAIN

- LS1028 pure application layer code
- Preempt-RT enable
- 500us cycle frame to rt1170, offset 0 send frame, offset 250us send out by Qbv
- RT1170 500us send back status



FRAME INPUT OFFSET ON SWP4

- RX offset configure by Qbv



```
t0 00000011b 1000  
t1 00000101b 1000  
t2 00001001b 1000  
t3 00010001b 1000  
t4 00000001b 496000
```


TSN DEMO SHOW



M4 DEAL DATA TIMESTAMP

1US JITTER SYNC

a -357.2ns 3.240 V
-331.2ns 3.320 V
b Δ 26.04ns Δ 80.00mV
Cursors Linked

1

2

3

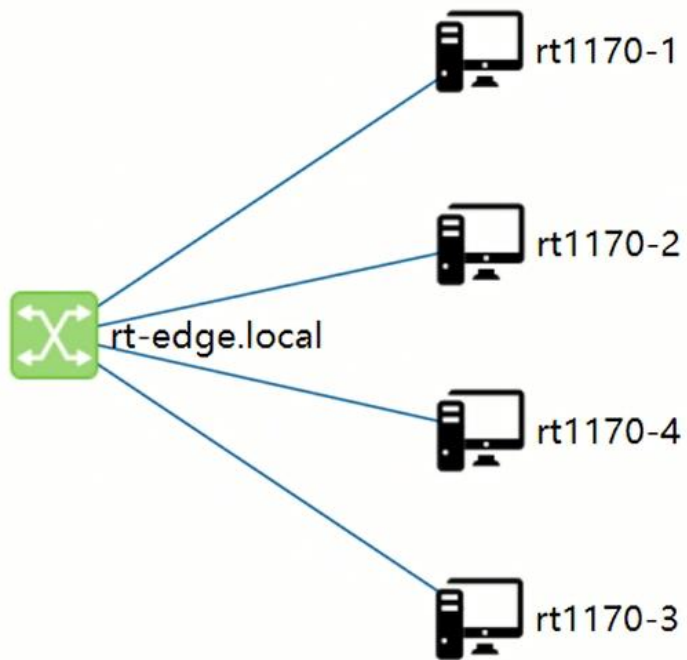
1 5.00 V 2 5.00 V 3 2.00 V 4 5.00 V

	Value	Mean	Min	Max	Std Dev
2 Frequency	----.Hz	No period found			
1 Frequency	----.Hz	No period found			

400ns
8.00000ns

2.50GS/s
10k points

1 1.60 V



rt-edge.local

<u>LOCAL INT.</u>	<u>NEIGHBOR</u>	<u>NEIGHBOR'S INT</u>
swp0	rt1170-1	enet_qos
swp1	rt1170-3	enet_qos
swp2	rt1170-2	enet_qos
swp3	rt1170-4	enet_qos

Enabled Interfaces without LLDP Neighbor:

<u>LOCAL INT.</u>	<u>DESCRIPTION</u>	<u>Bandwith</u>
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