The Digital Distributed Antenna System over Ethernet

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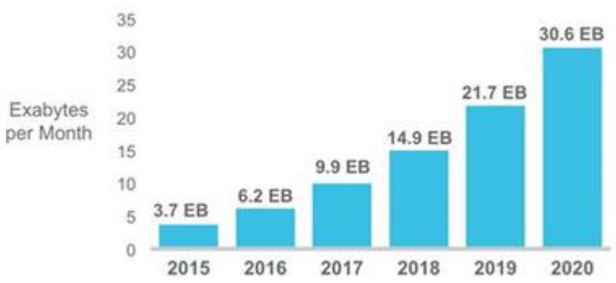
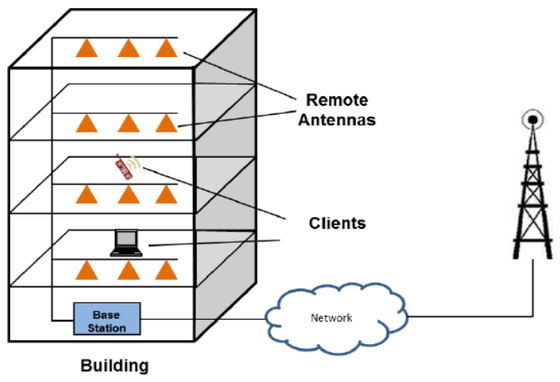
1. Background



- Rapid growth of mobile data traffic
- Most traffic [1]

Happened in doors!

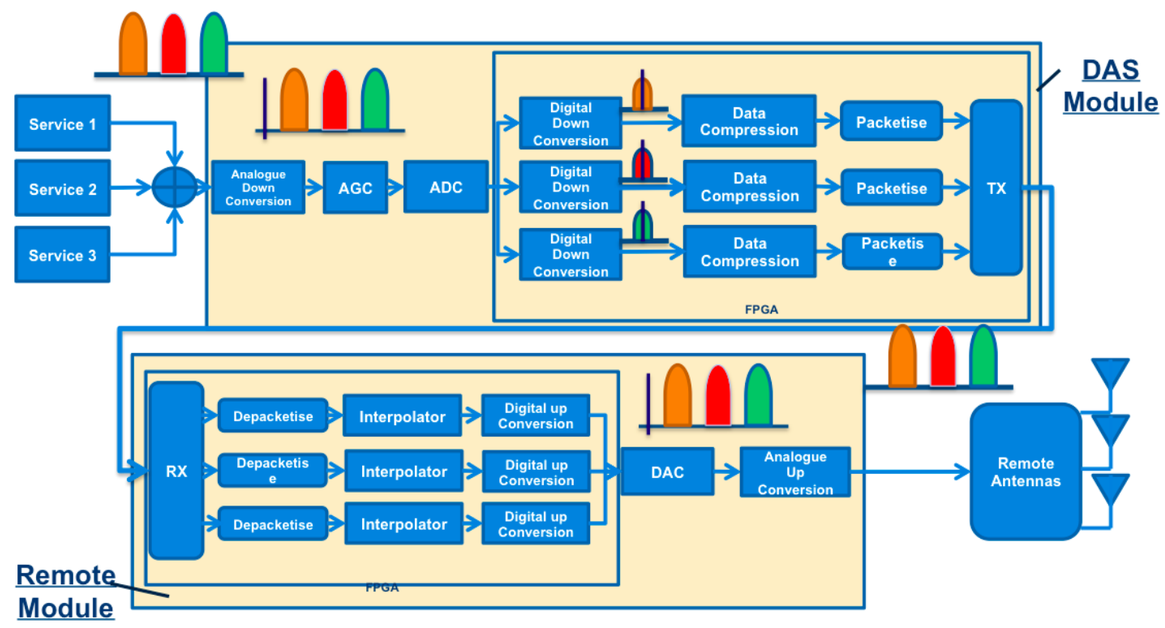
Distributed Antenna System (DAS)



In-building wireless system [2]
-- remote antennas
-- transport medium
-- base station

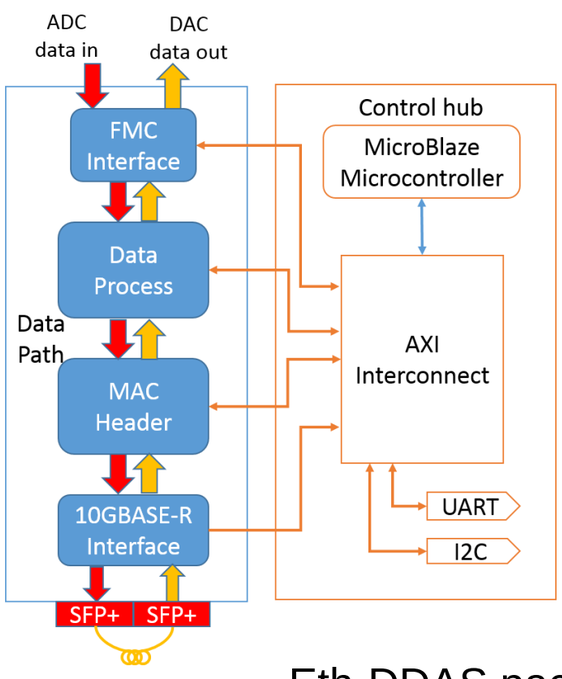
Problems:
❑ Analogue Signal are uncontrollable

2. Digital DAS



A novel digital distributed antenna system [3]:
✓ Channel Versatility: optical fibres, coaxial cable, twisted pare cables
✓ Multi-service potential
X Unreliable Physical layer
X Require indoor network installation.

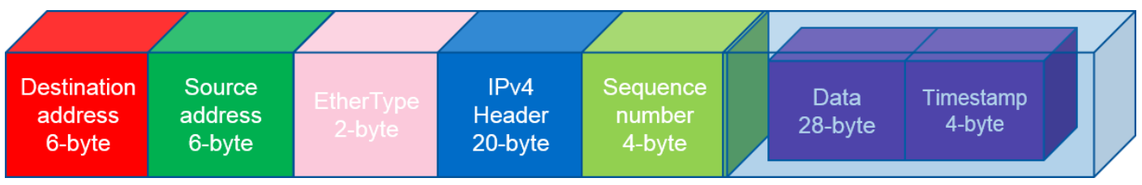
3. Eth-DDAS



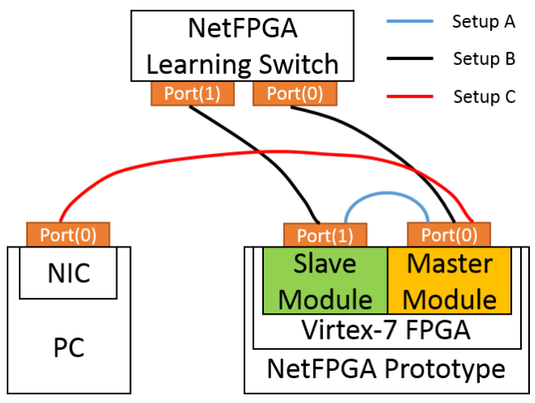
A NetFPGA-SUME based prototype

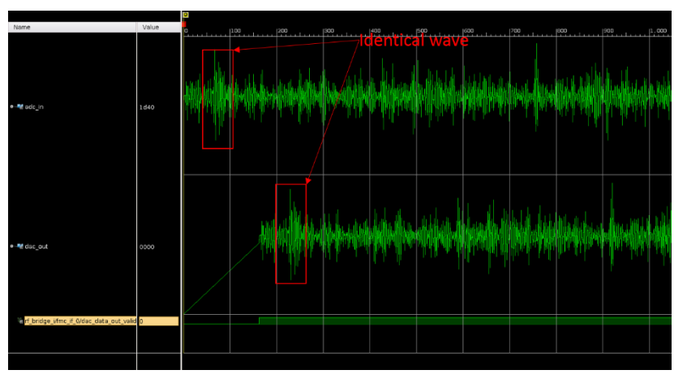
✓ Reconfigurable
✓ 10GBASE-R Compatible
✓ Improved Physical Layer
✓ CPRI Compatible(5us)
✓ Traffic control
✓ Low cost

Eth-DDAS packet frame



4. Experiments & Results

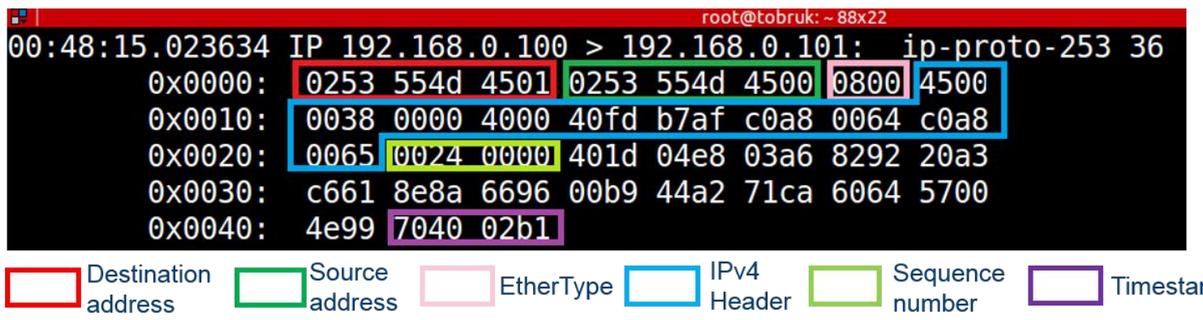




Setup A: self-loopback
Setup B: over switch loopback
Setup C: connect to PC

➢ Signal recovery:
-- ADC input
-- DAC output

➢ Output packet capture



➢ Latency measurement :

Payload Size	FMC loopback	10G loopback	switch loopback
32 Bytes	346.67(±6.67)ns	1026.67(±6.67)ns	1846.67(±6.67)ns

- Reliability:

Overall Link BER < e-12
Frame Error Rate < e-11 (4e11 frames bank received)

References

[1] S. Chen and J. Zhao, “The requirements, challenges, and technologies for 5g of terrestrial mobile telecommunication,” IEEE Communications Magazine, vol. 52, pp. 36–43, May 2014.

[2] C. G. Ranson, F. W. Phillips, and T. Kummetz, “Transport data reduction for das systems,” Apr. 1 2015. US Patent App. 14/676,325.

[3] T. Li, R. V. Penty, and I. H. White, “Novel digital radio over fibre for 4g-lte,” in 2015 IEEE International Conference on Communication Workshop (ICCW), pp. 312–317, June 2015.

Further Discussions

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