

Waveforms and architectures for low-latency fronthauling

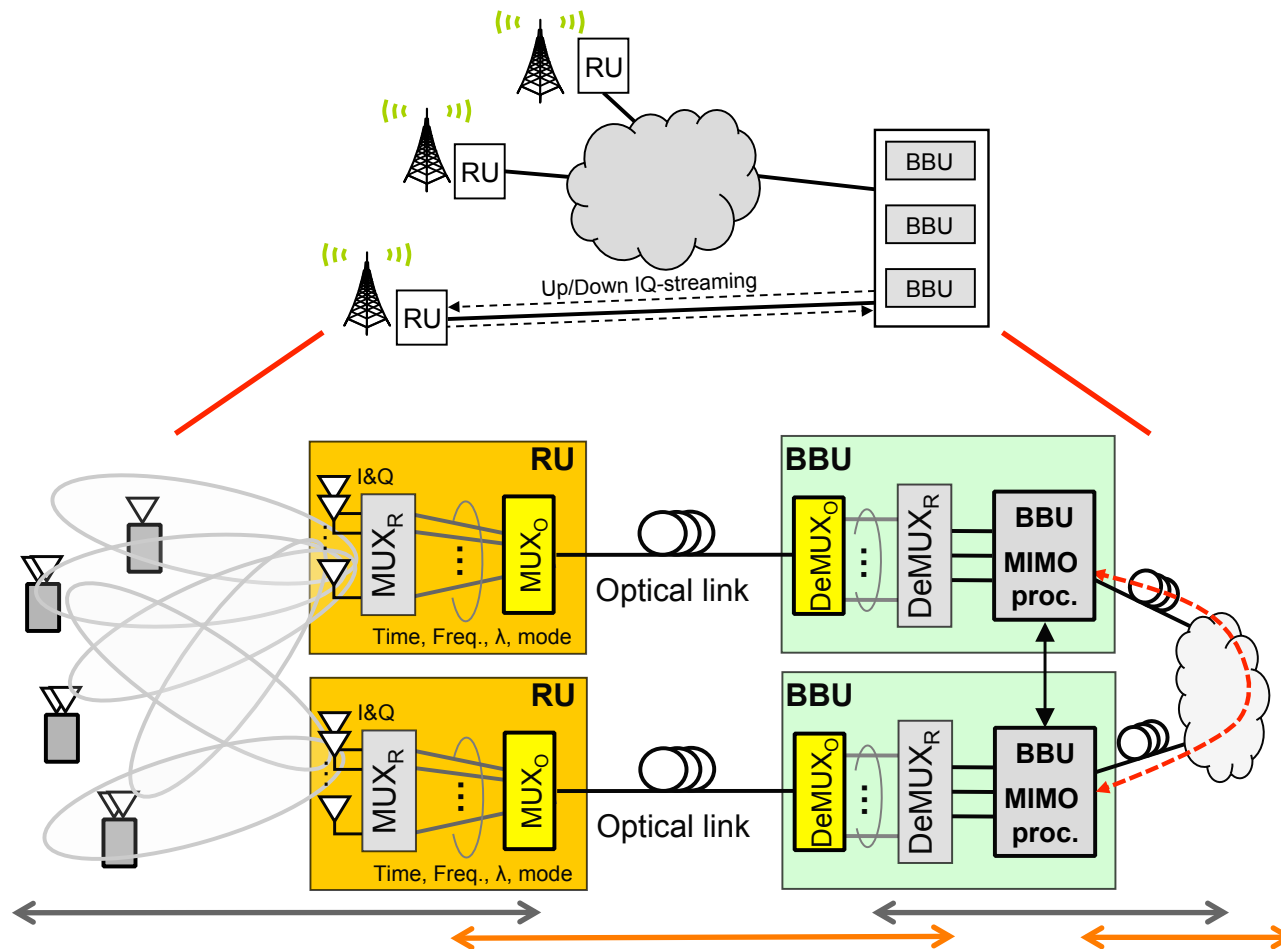
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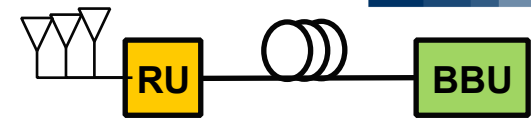


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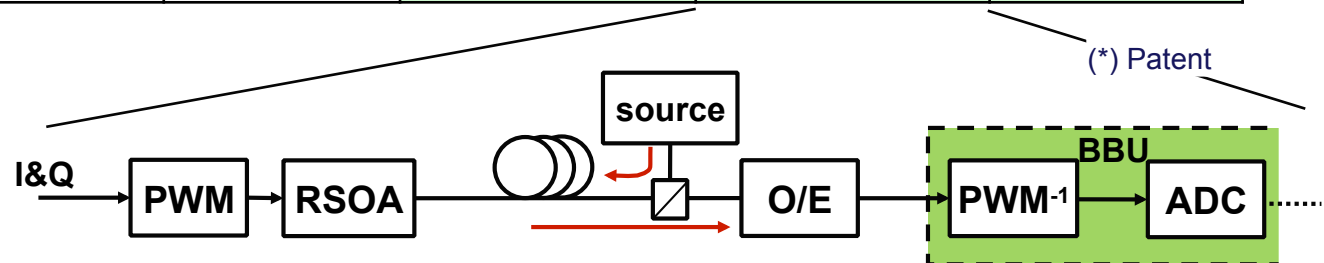
Cooperation between complementary skills on optical and wireless communications allows better exploitation of mutual synergies



Front-hauling results

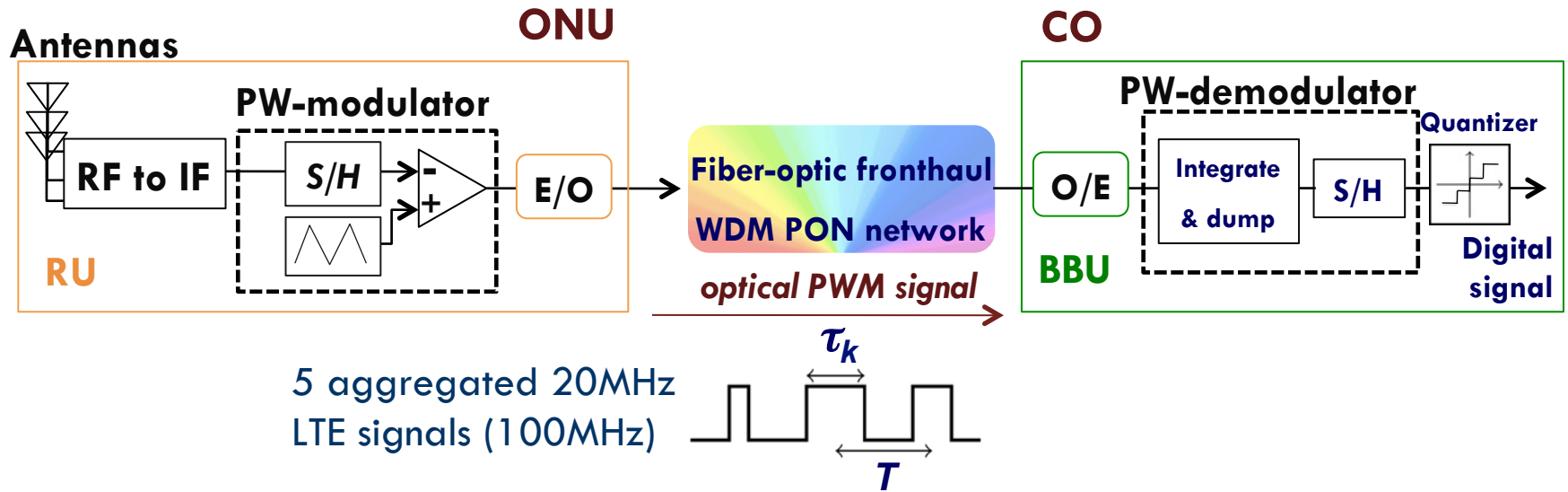


	CPRI	RoF	PWM-CRAN* [Globecom2015]	R-PWM* CRAN [OFC2016]	RoC* [CommMag14, ERI-RadioDots]
Bandwidth expansion	x16-18	x1	x1	x1	x1
Latency (5G: <1ms)	medium (few ms)	low (propagation)	low (one smpl int.)	low (one smpl int.)	low (propagation)
complexity & components	High-speed electronics & optics	Low-speed electronics & optics	low-speed electronics, high-speed optics (laser)	low-speed electronics, high-speed optics (RSOA)	low-speed electronics
linearity of components	recommended	mandatory (optics)	not necessary only electronics	not necessary only electronics	mandatory (electronics)
synch.	Packet-level	Carrier&freq. symbols	carrier frequency (downconversion) and symbols	carrier frequency (downconversion)	carrier frequency and symbols
power supply of RU	external	external	external	external	Power over ethernet
Flexibility	no	no	no	yes	yes

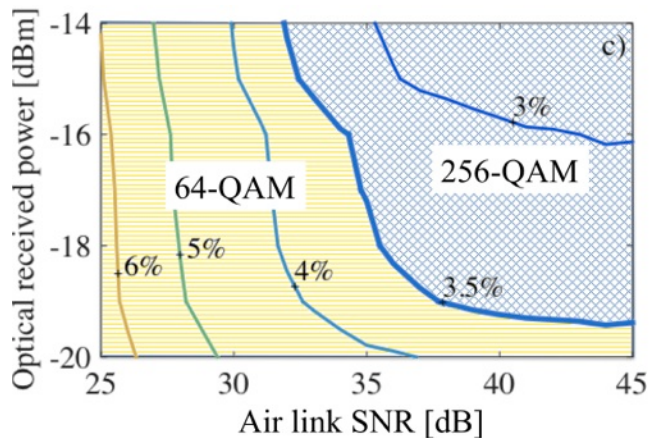




In-Lab experiments of PWM-CRAN...ongoing...



RU-BBU uplink after 20-km SSMF



CPRI-equivalent data rate:

$$100 \text{ [MHz]} \times 1.5 \times 2 \times 16 \text{ [bits/sample]} \times 10/8 = 6 \text{ Gb/s}$$

OFC 2016, 20-24 March Anaheim, CA, USA
Fixed Mobile Convergence II, paper W3C.6



Joint expertise on optical comm. and signal processing



Optical Communication

- Fiber optic access networks
- WDM PON networks for fronthaul
- RSOA based colorless self-tuning transmitters [FP7 ERMES]
- All-optical OFDM and FDM PON
- FDM for high capacity transmission in bandwidth-limited systems
- Short-mid haul transmission with VCSEL
- Spatial and mode division multiplexing
- OAM optical mux/ demux
- MIMO-free and reduced MIMO MDM systems
- Full-mesh fiber-based backplane



Signal processing for communications

- Wireless relay over fiber, copper, mmWave
- Interference mitigation (wireless & copper, G.fast)
- Functional split and content caching
- Channel estimation and distributed synchronization [FP7 DIWINE]
- RR optimization: HSPA, WiMAX, LTE, ... high speed trains [Prisma-Telecom Testing]
- Localization methods: Bayesian, ToD-UWB, RSS-based, cooperative, navigation
- WSN: cooperative relaying, energy harvesting, virtual MIMO, advanced applications: oil exploration, radio-imaging



7 Faculty, 5 Res.Ass.&Post-Docs, 10 PhDs, 8 MSc/year

POLICOM Lab and Fab facilities



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