Waveforms and architectures for low-latency relaying

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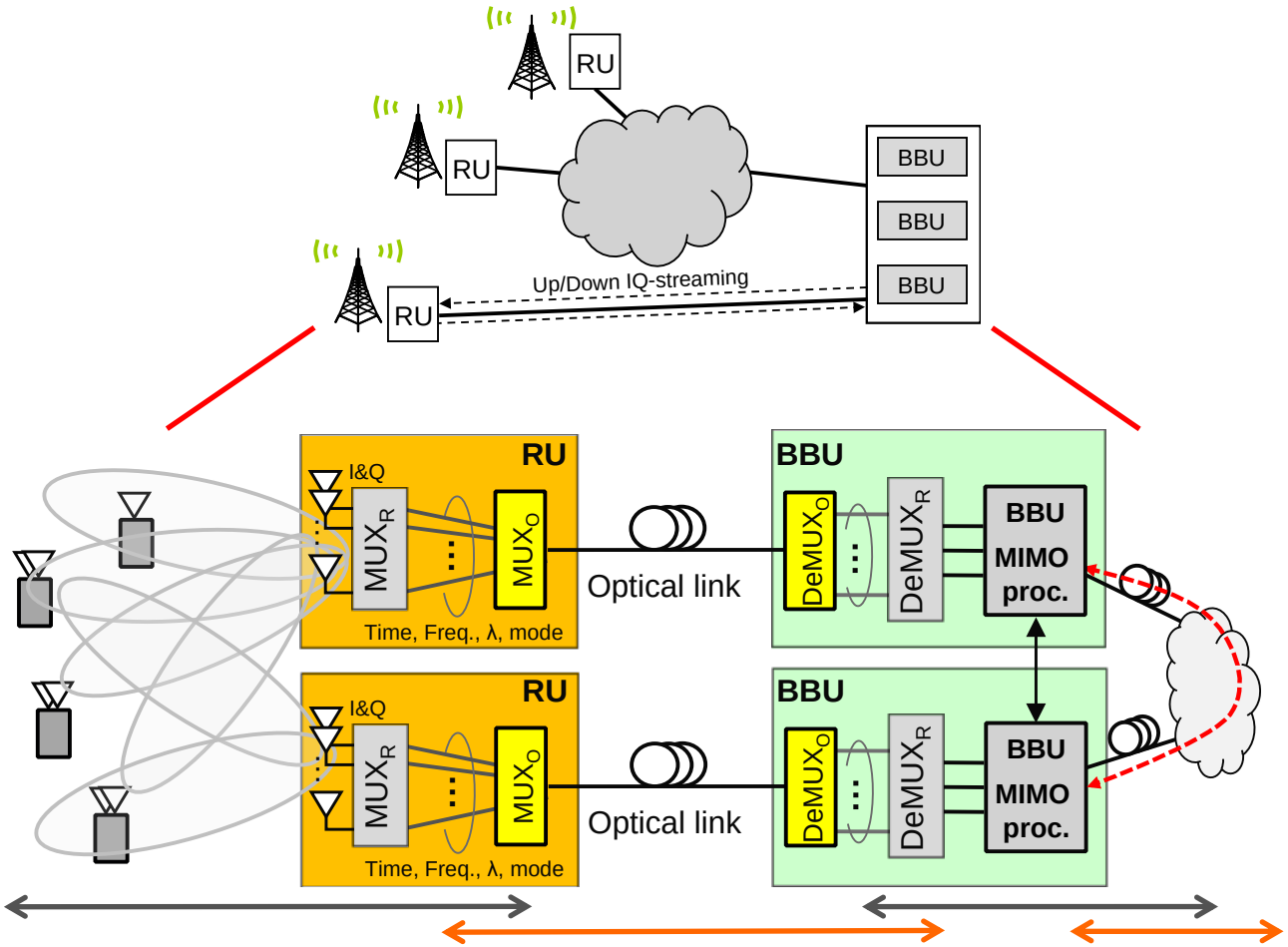


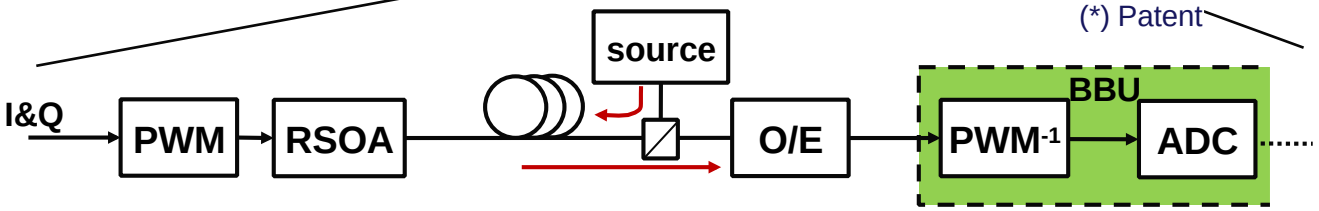
POLICOM:

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

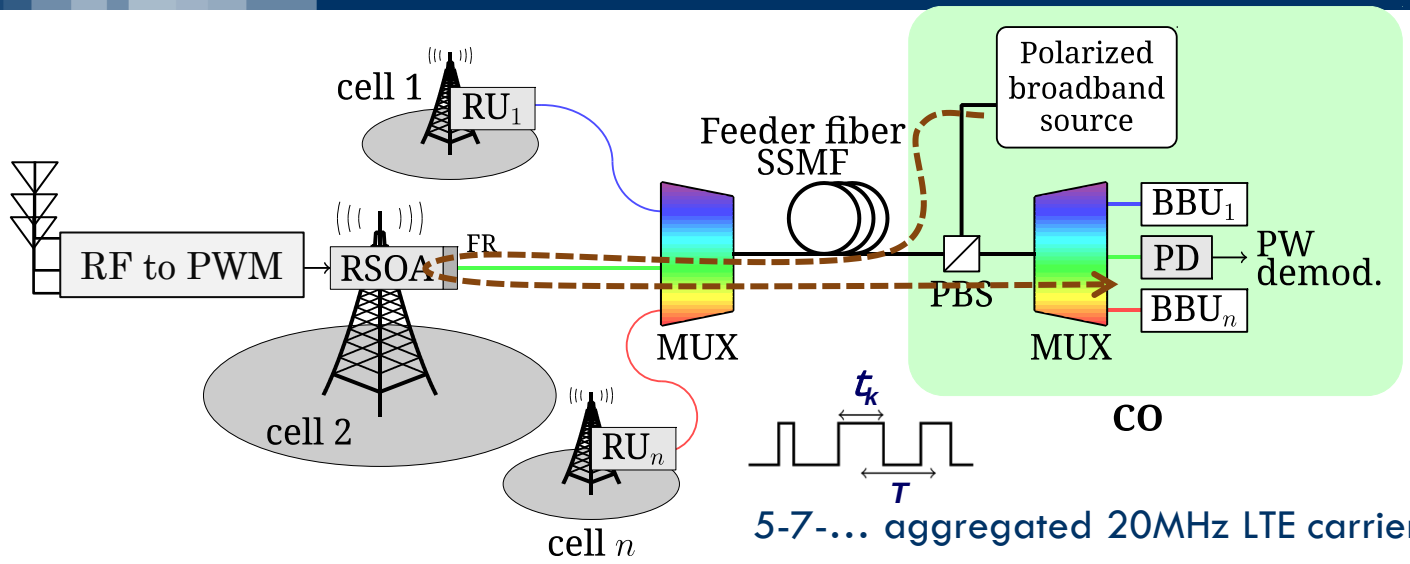
Front-hauling: radio-signal relaying

	CPRI	RoF	PWM-CRAN* [Globecom2015]	R-PWM* CRAN [OFC16, ECOC16,…]	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

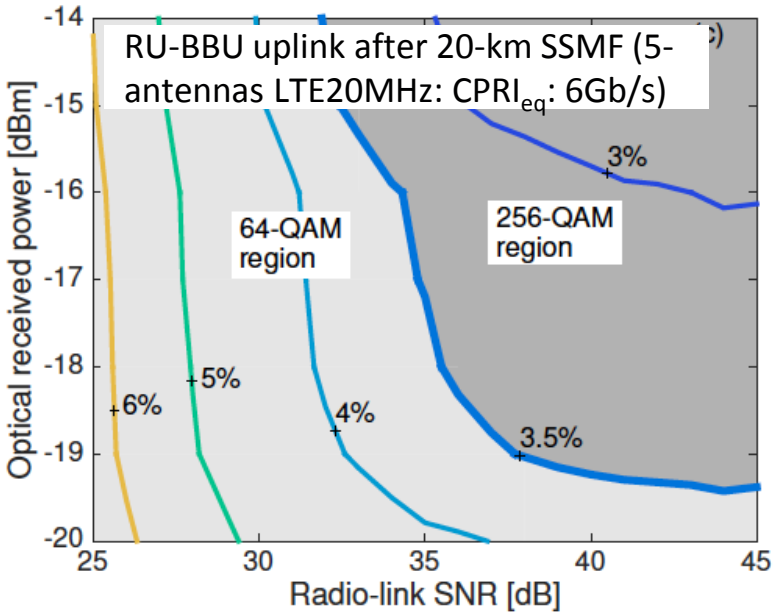
(*) Patent

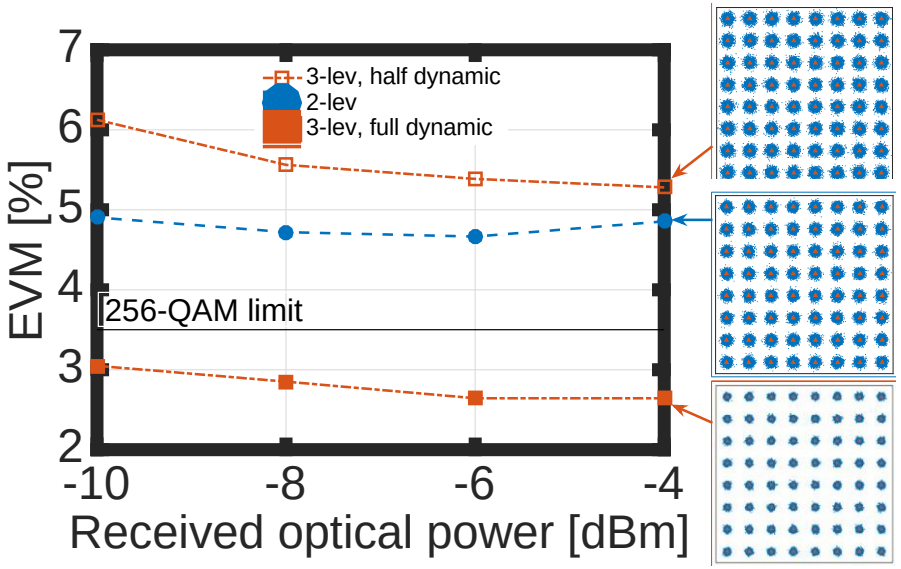


Reflective-PWM relaying over fiber



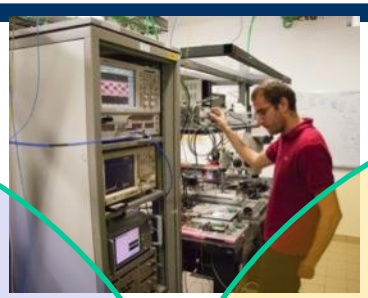
5-7-… aggregated 20MHz LTE carriers (e.g., antennas)





Multilevel-PWM 8 LTE 20MHz channels after 7.5-km SSMF [ECOC'16]

Joint expertise on optical comm. and signal processing



Optical Communication

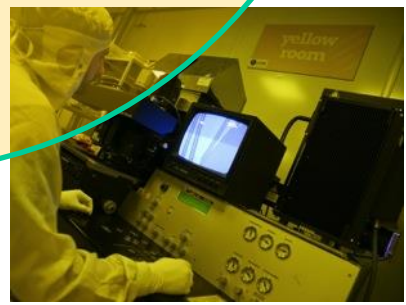
- Fiber optic access networks
- WDM PON networks for fronthaul
- RSOA based colorless selftuning transmitters [FP7 ERMES]
- All-optical OFDM and FDM PON
- FDM for high capacity transmission in bandwidth-limited systems
- Short-mid haul transmission with VCSEL
- Spatial and mode division multiplexing
- 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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