



# Here's the first mobile radio-telephone (1924)!

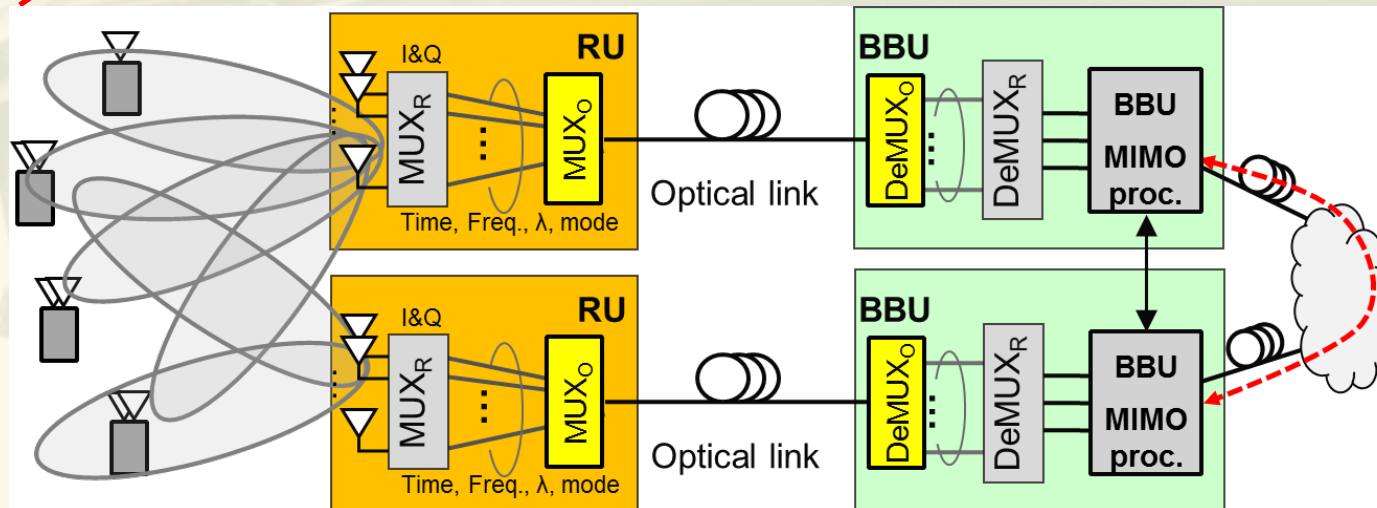
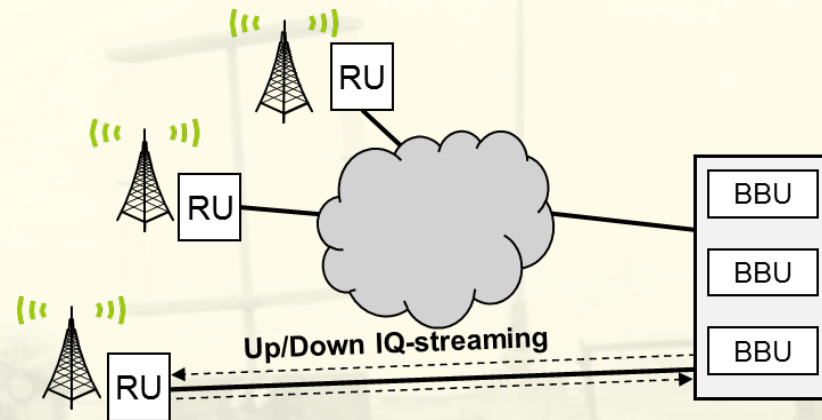
1

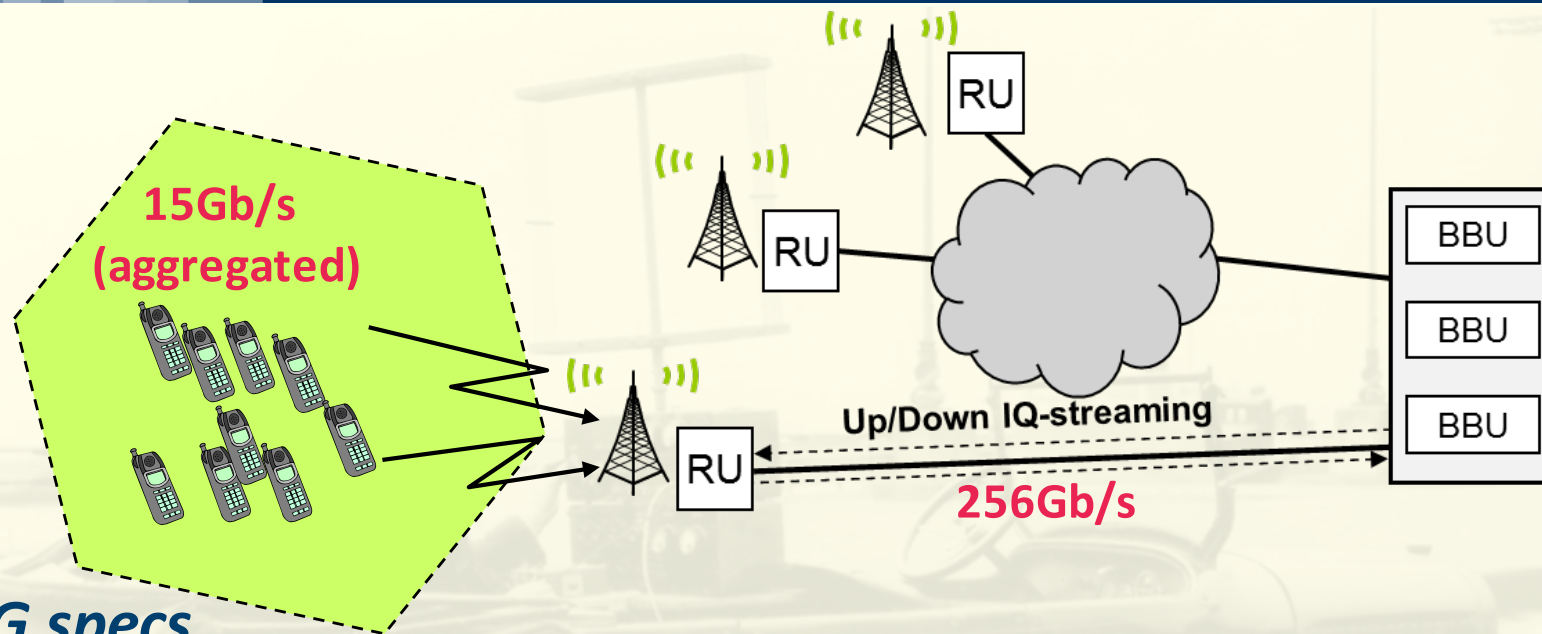


Courtesy of Rich Howard



# Centralized-Radio Access Network (C-RAN)





## 5G specs.

MIMO 64 antennas,  $BW_{OFDM}=100\text{MHz}$ , 256QAM  
Air-link datarate (MIMO 64x2): 15Gb/s (approx)

## Digital IQ streaming (CPRI):

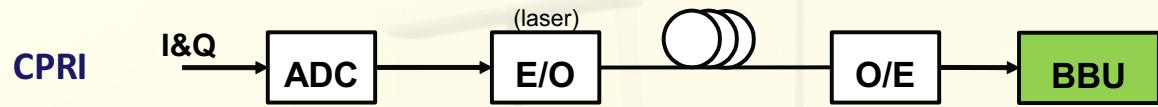
$$2 \times 100\text{MHz} \times 16 \times 64 \times (10/8) = 256\text{Gb/s}$$

## CHANGE THE TRANSMISSION PARADIGM

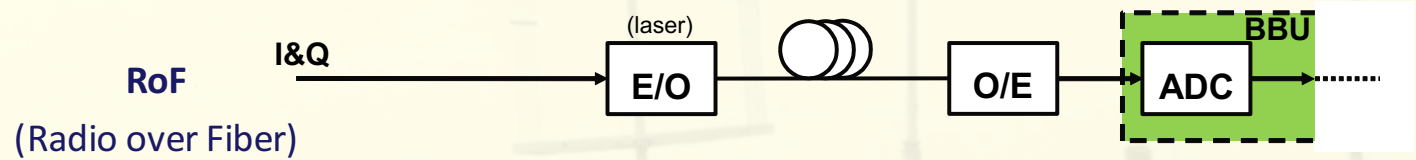


# Front-hauling techniques (MU-MIMO64x(2x32))

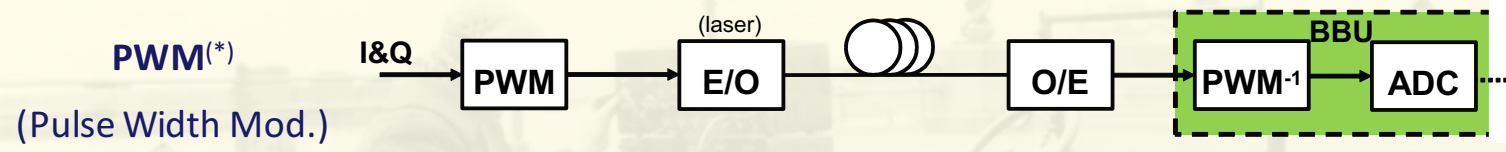
**IQ streaming specs.**



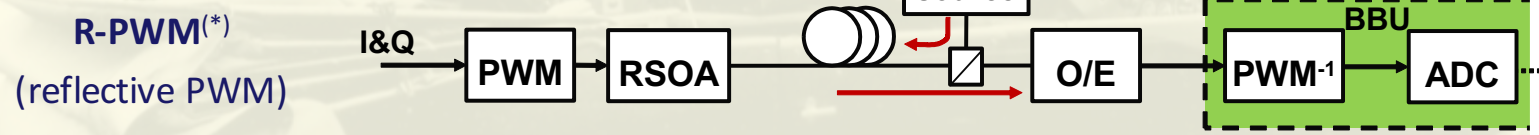
256Gb/s



6.4GHz



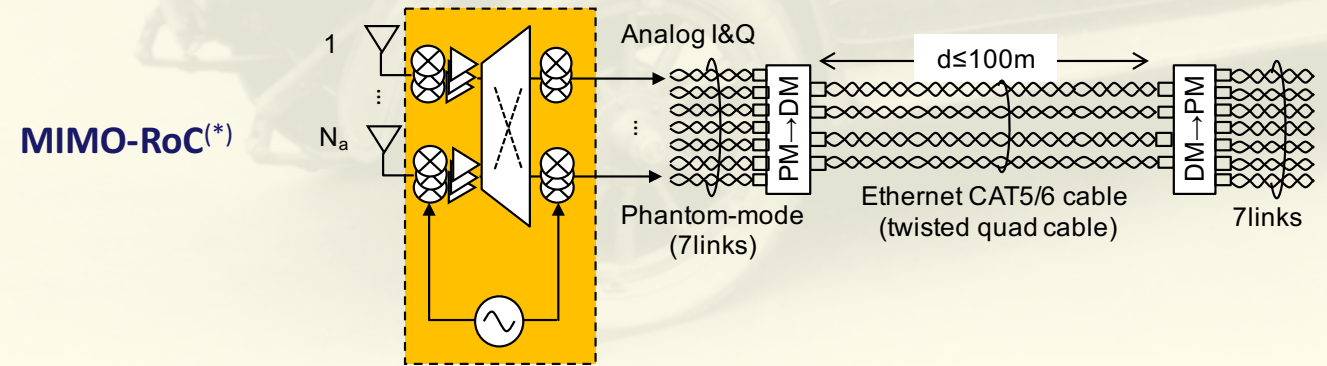
15-20GHz



15-20GHz



100MHz  
(1antenna) but  
6.4GHz (no!)

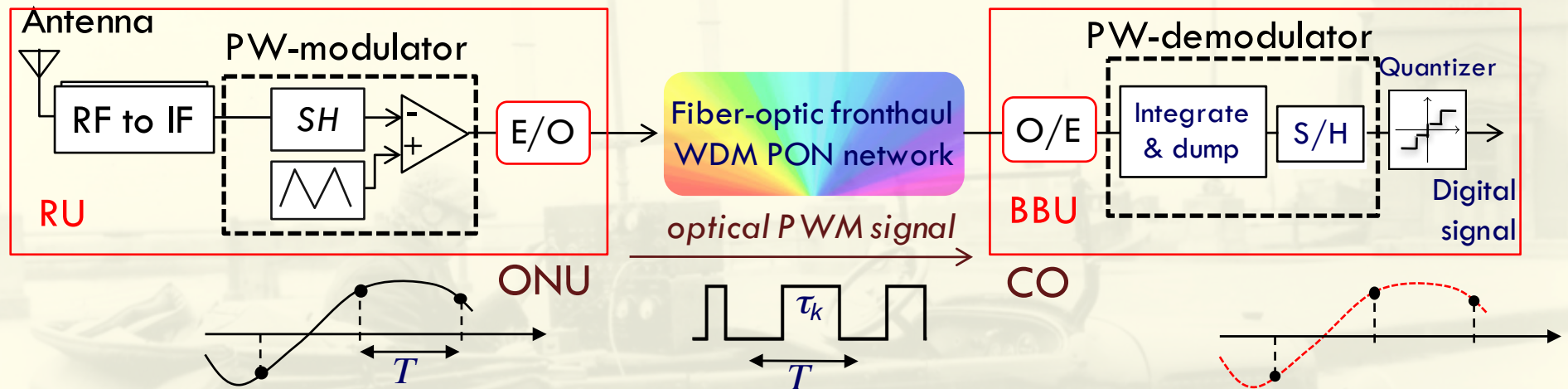


6.4GHz (ok!)

(\*) Politecnico di Milano Proprietary



Principle: splitting of the sampling and the quantization between RU and BBU



100MHz RF signal (approx 5 aggregated 20MHz LTE carriers)

CPRI-equivalent data rate (1 antenna):

$$100 \text{ [MHz]} \times 2.5 \times 16 \text{ [bits/sample]} \times 10/8 = 5 \text{ Gb/s}$$

I&Q  
(over)sampling

quantization

coding