



## High Capacity Radio-over-Fiber Links at 75-300 GHz

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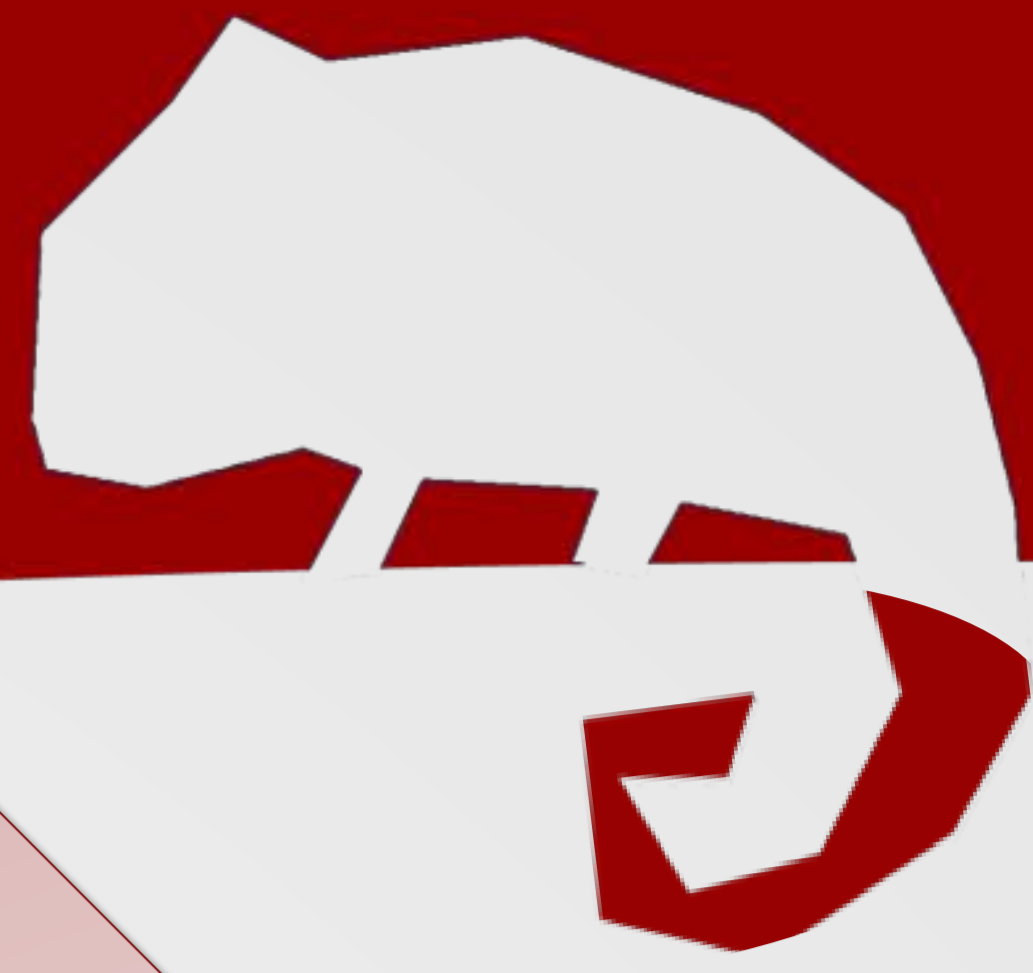
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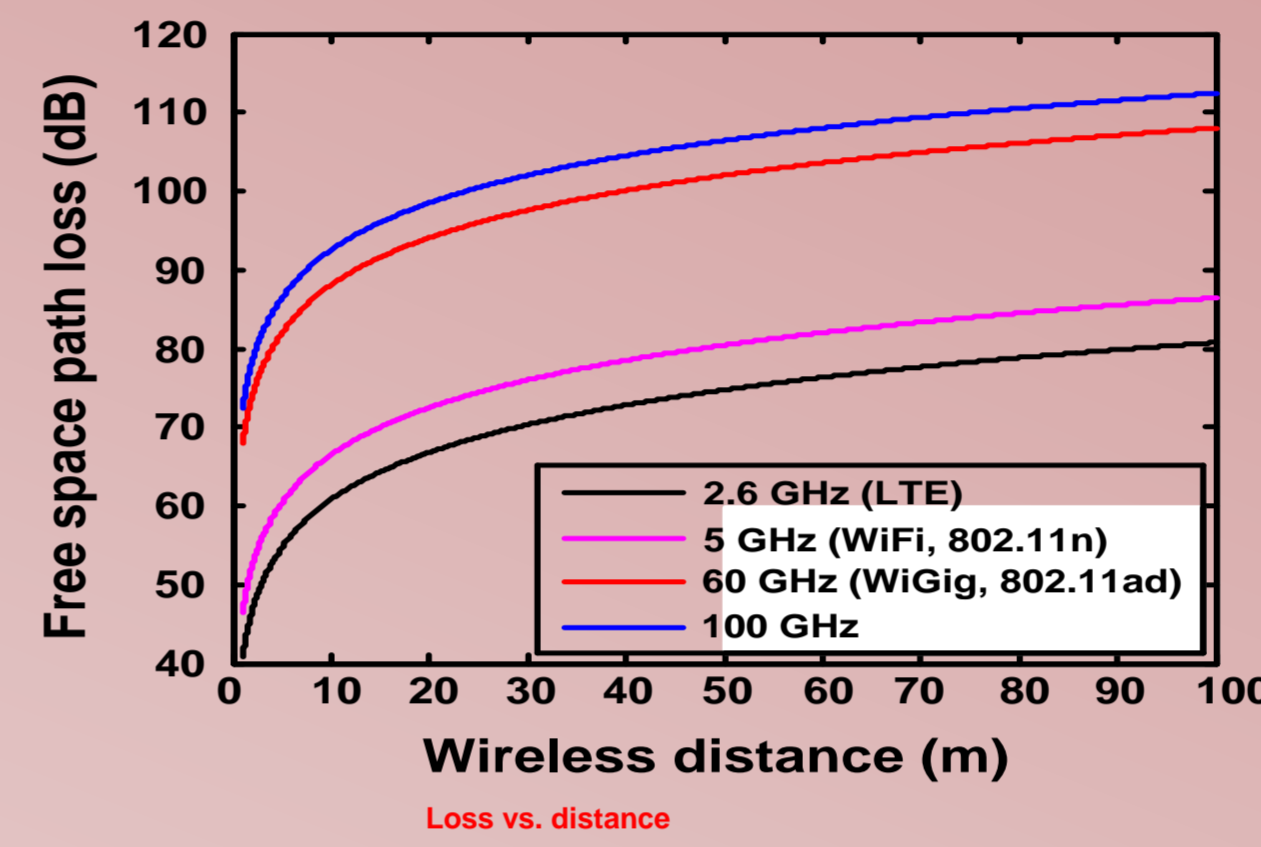
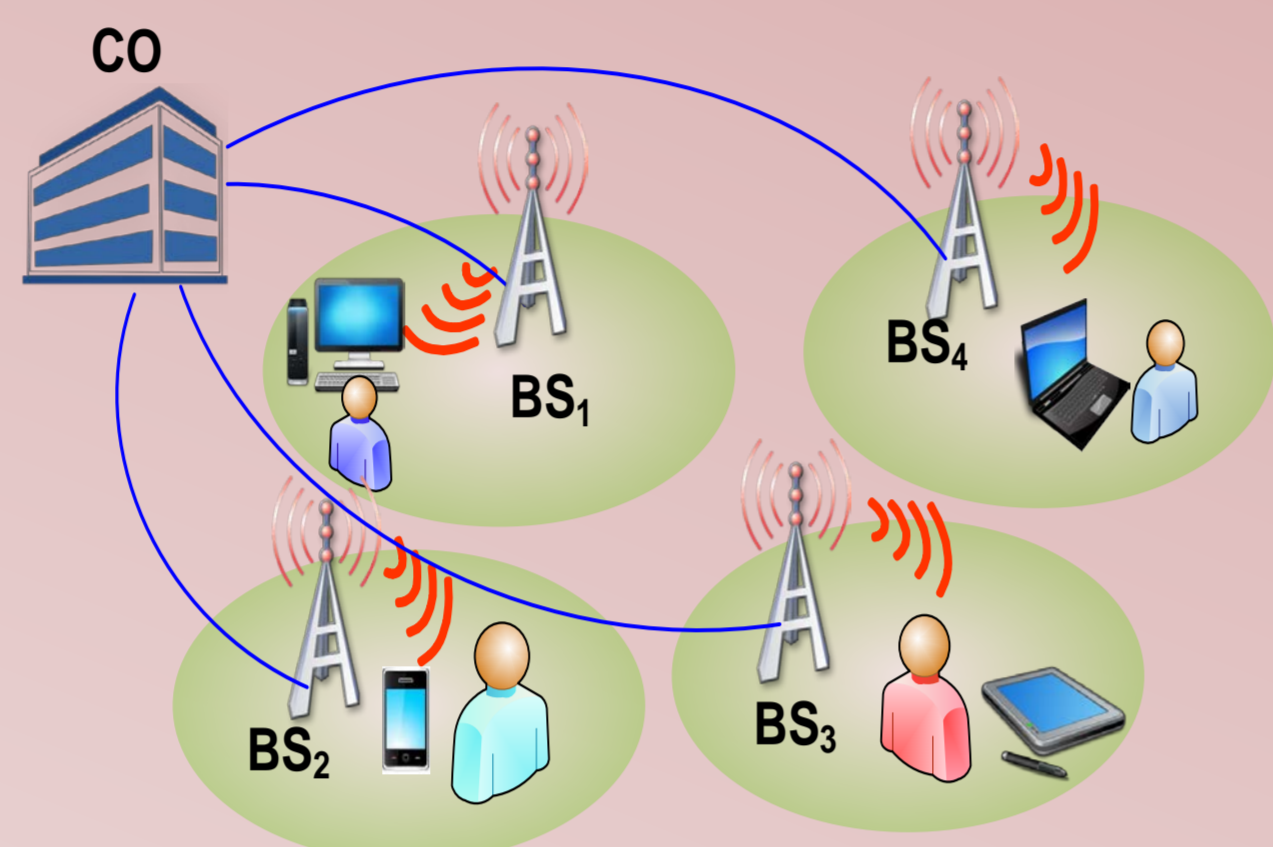
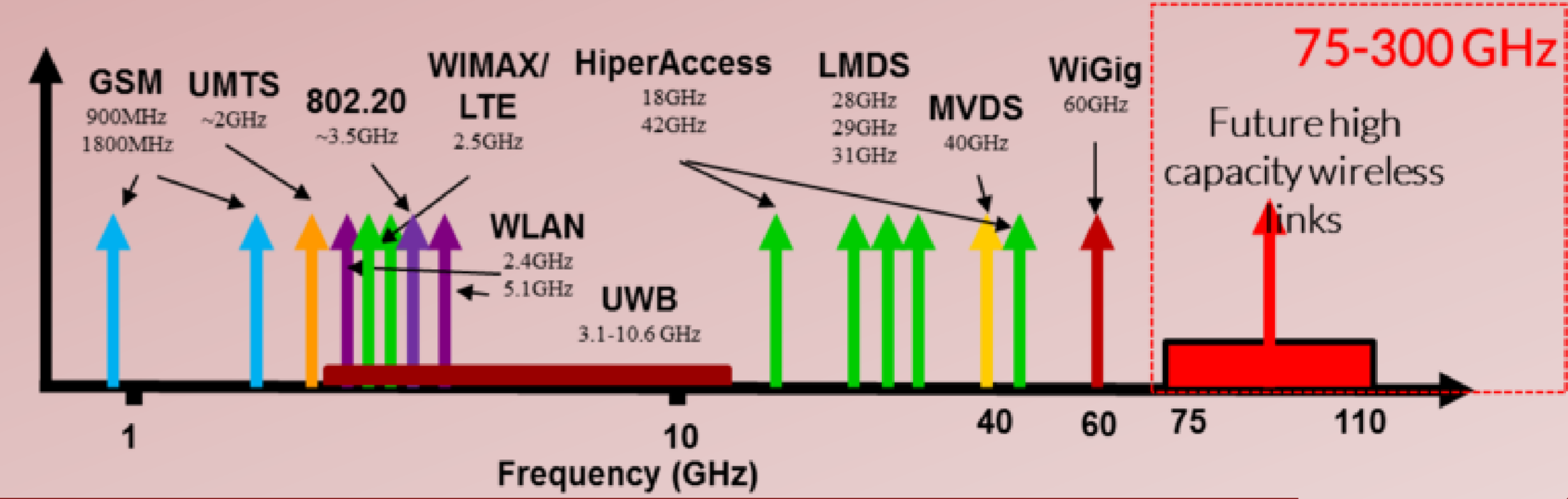
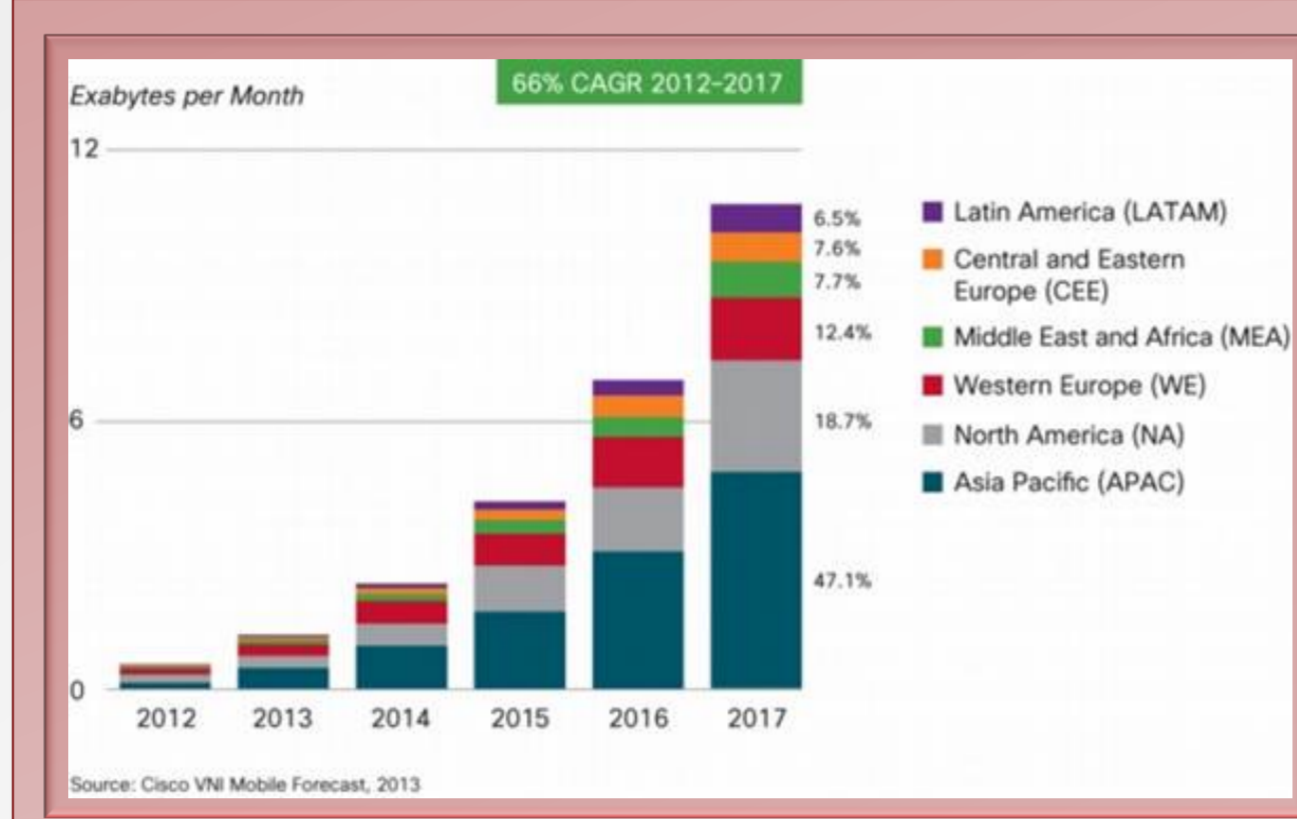
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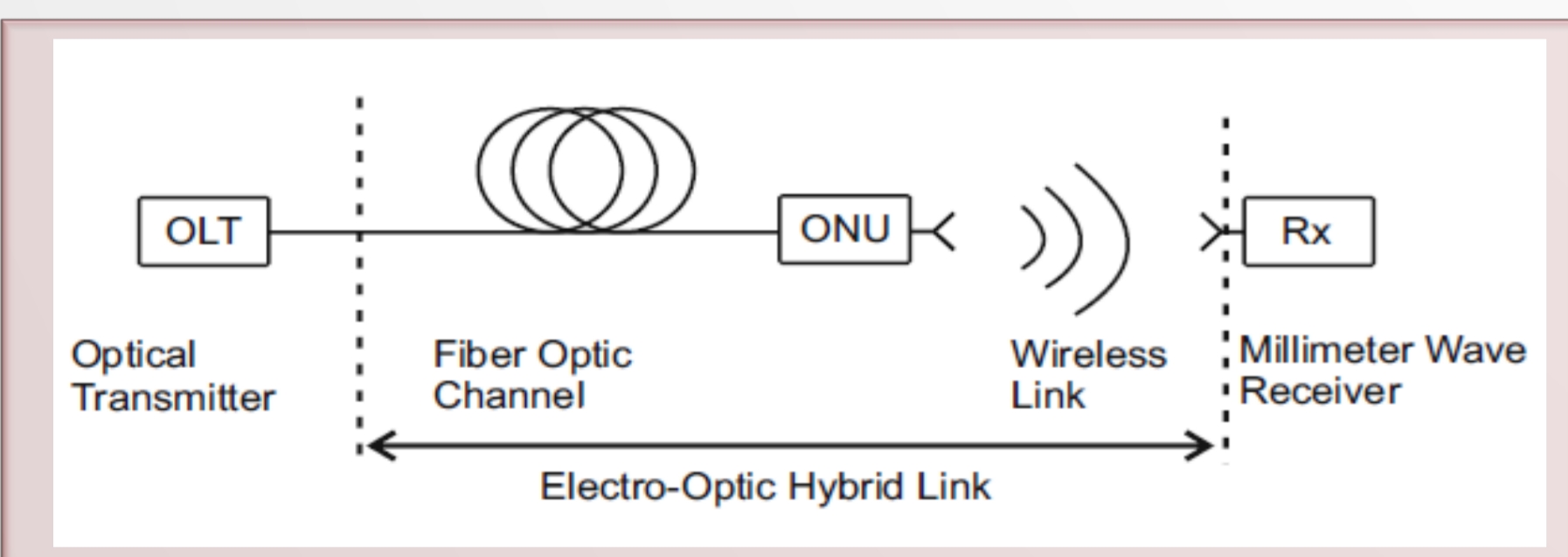
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- Radio over Fiber (RoF) represents a hybrid concept
  - Fiber
    - high bandwidth and low losses
    - continuously increasing bandwidth
  - Wireless
    - flexibility and mobility
    - lower capacity
    - operation in higher frequencies



- Advantages of using RoF at W-Band
  - Bandwidth (in terms of bits/s) is not a problem
    - Already developed technology, from optical communications
  - Transport over long distances (or short if one wishes)
    - Generators do not need to be next to the antenna
  - Very good scalability
    - Splitting and amplifying not really a problem in optics (*somehow*)

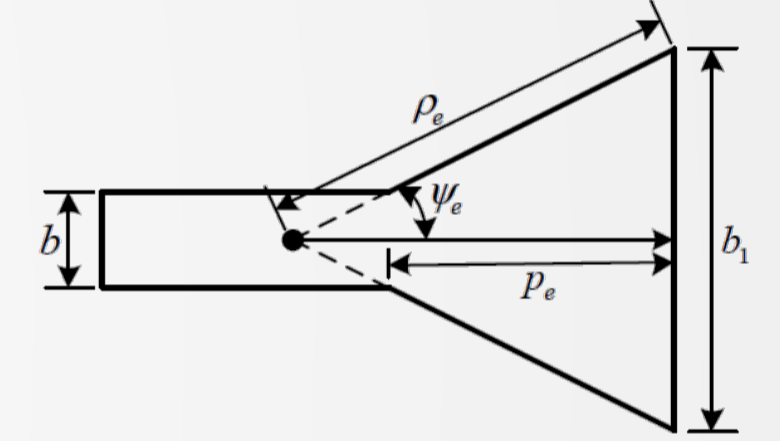
- Current work
  - Channel model for hybrid composite fiber-wireless
  - Use of advanced modulation formats

## How far can we go?

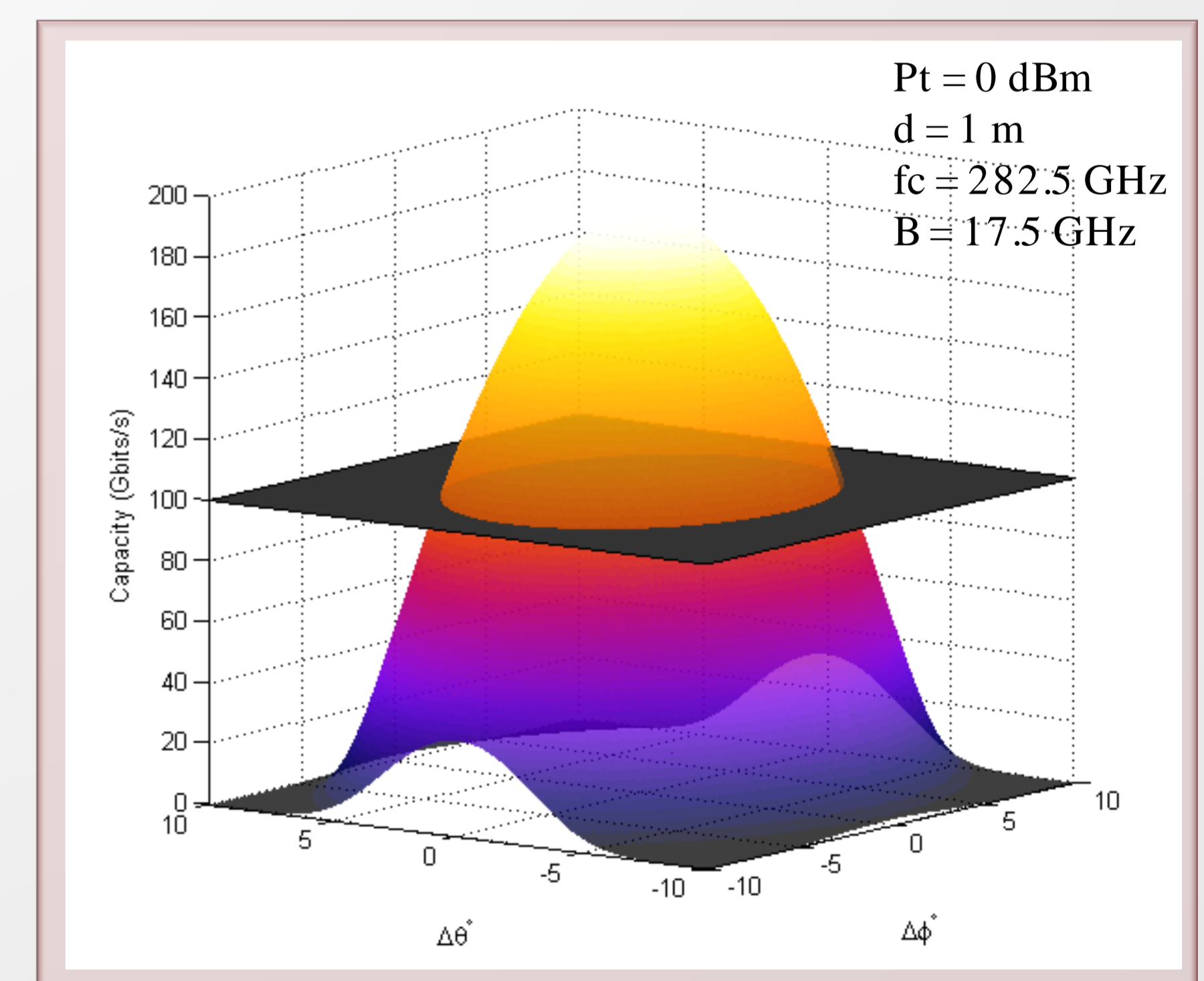
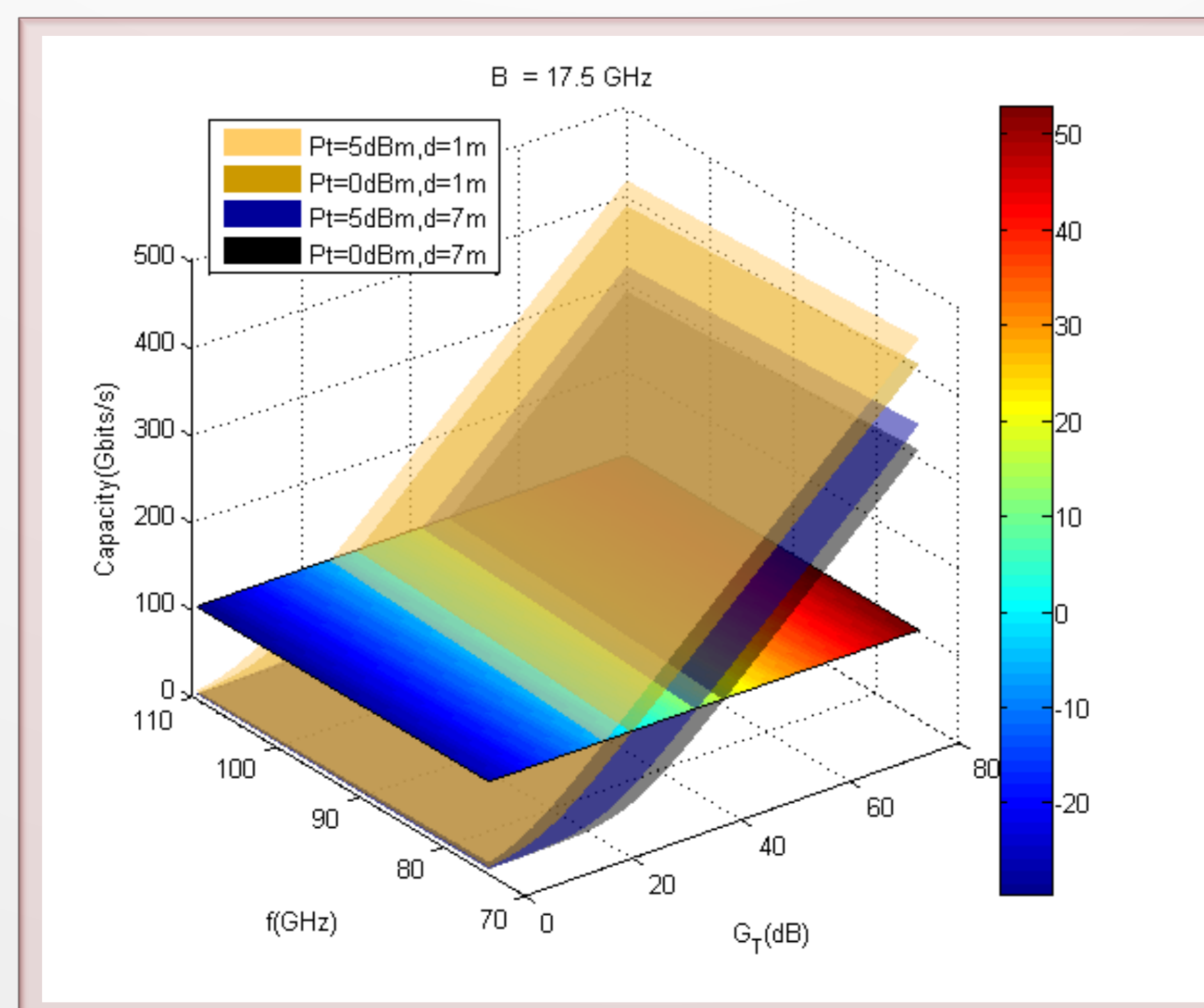
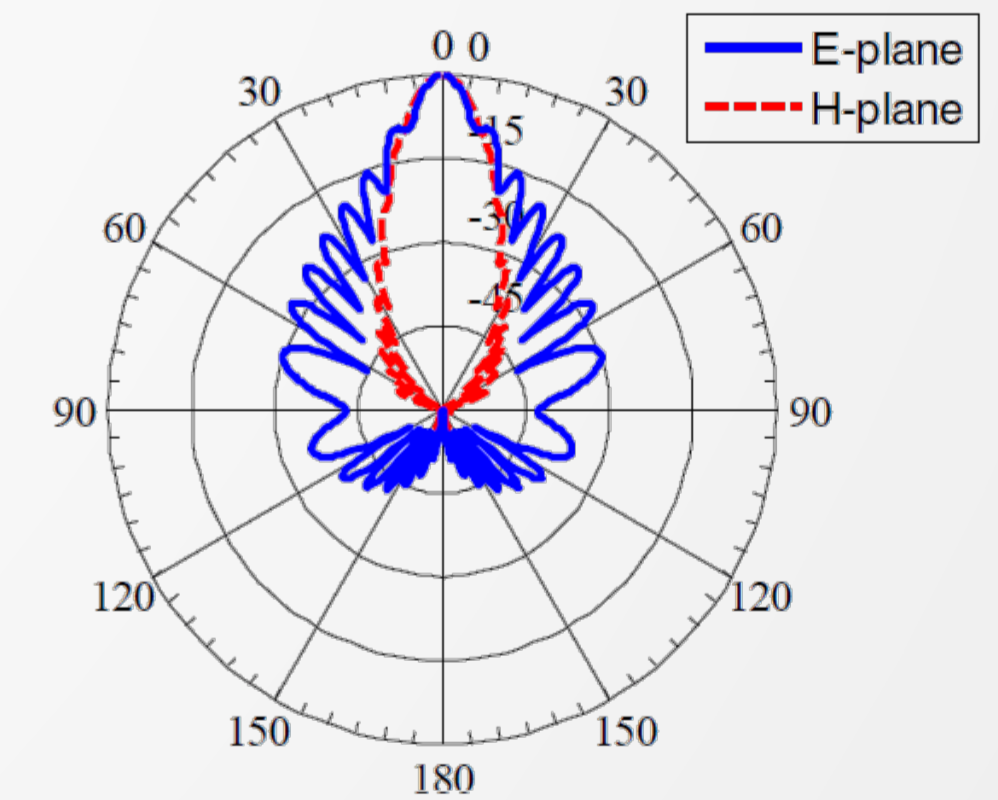
$$C = BW \cdot ld |1 + SNR|$$

$$SNR = P_T + G_T + G_R - L_{FS} - IL - (N_0 + 10 \log_{10} B + NF)$$

$$L_{FS} = 20 \log_{10} \frac{4\pi f d_0}{c} + 10n \log_{10} \frac{d}{d_0}$$



$$G(\phi, \theta) = G_0 \cdot e^{-\left(\frac{\phi, \phi_0}{\sigma_{g, \phi}}\right)^2} \cdot e^{-\left(\frac{\theta, \theta_0}{\sigma_{g, \theta}}\right)^2}$$



- Photonic technologies enable high capacity wireless links:
  - 100 Gbps wireless transmission
  - Transmission over different types of fibers
  - DSP techniques fairly mature
  - Bidirectional wireless-optical fibre bridge