

# PLCの明るい未来について

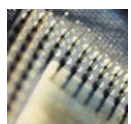
## A Bright Future

Dr. Stephan Horvath

CEO and CTO  
ACN Advanced Communications Networks SA

Director, Technology Planning  
HD-PLC

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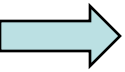
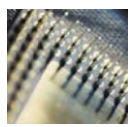
## Education and research:

- Doctor of science Degree (Dr. sc. techn.) of the Swiss Federal Institute of Technology (ETH) in Zürich, Switzerland.
- Head of two Research groups in digital signal processing at the ETH.

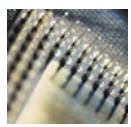
## Career in the industry:

- Deputy VP of Engineering at GRETAG (Communications security)
- VP of Engineering and Deputy CTO, later, Deputy Head of Business Unit "InfoCom" at ASCOM
- CEO and CTO at ACN Advanced Communications Networks

Expert in Access BPL and Smart Grid communications. Field experience in Austria, Germany, Italy, and Switzerland.



- Key success factors:
  - Bandwidth-efficient notching and frequency separation
  - Achievable data rates over different channel spreads
- Future extensions of the HD-PLC technology for the European market:
  - Smart Grid: narrowband two-way communications for meter reading
  - Provisioning IPTV services in condominiums
- Making it real: Interoperability and conformance testing



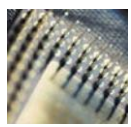
There are two good reasons for believing in a bright future:

1. The Wavelet-OFDM technology has inherently two unique advantages over all competitive PLC technologies
2. These unique features are absolutely necessary for all mainstream applications on the market

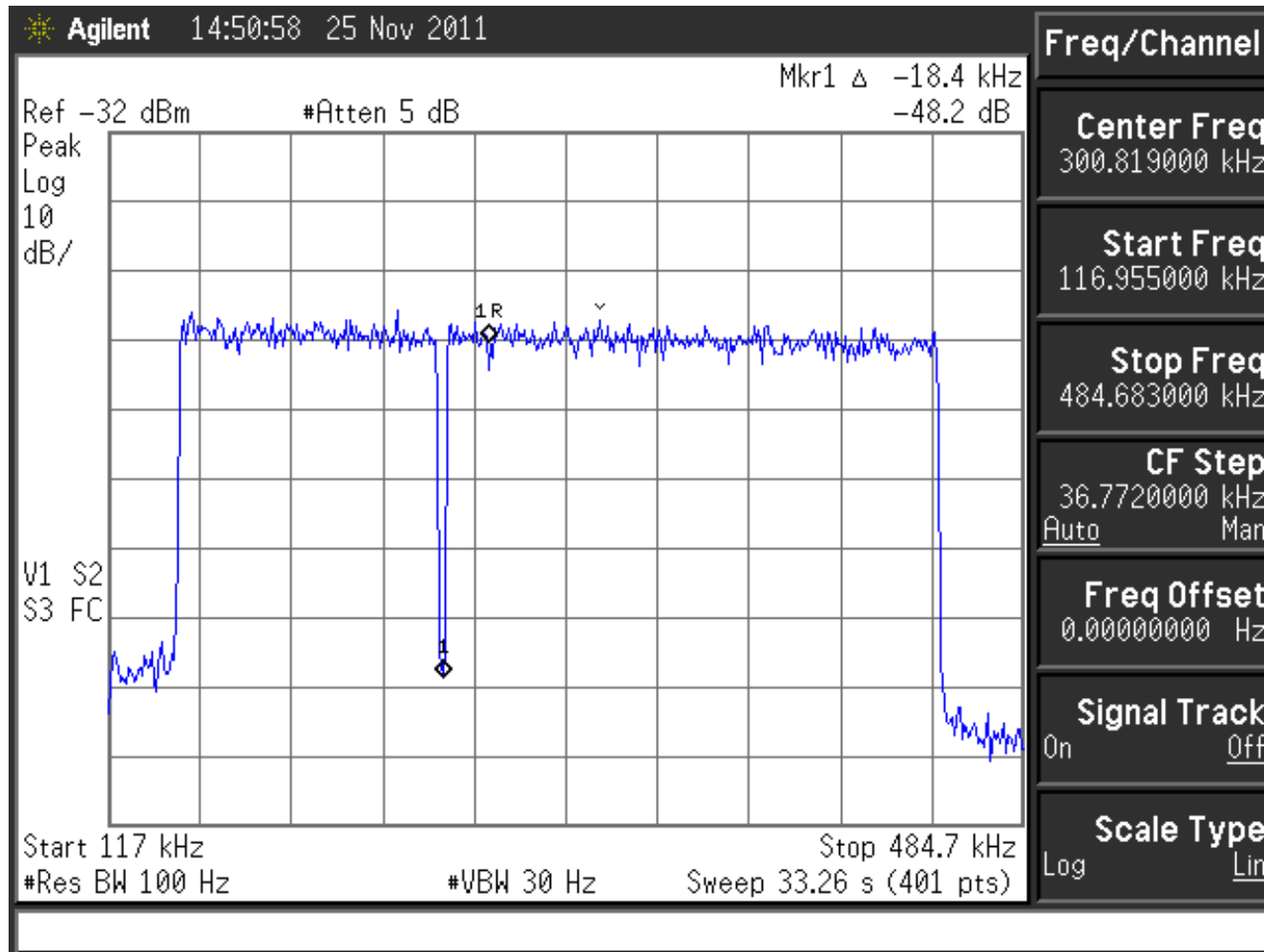
The two unique advantages are:

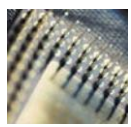
- Bandwidth-efficient notching and frequency separation
- Achievable data rates over different channel spreads

Both are mission-critical features, necessary for market success.

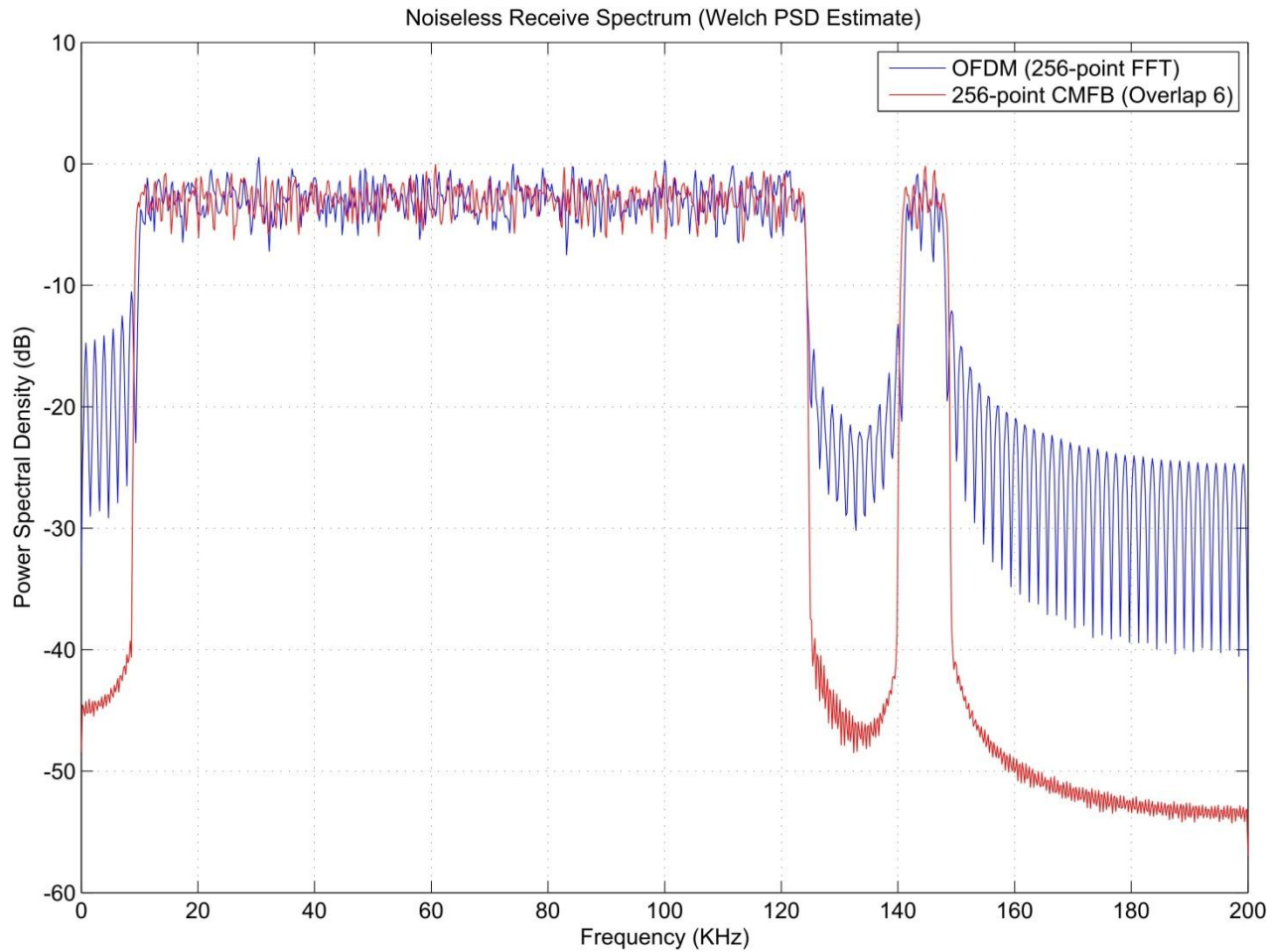


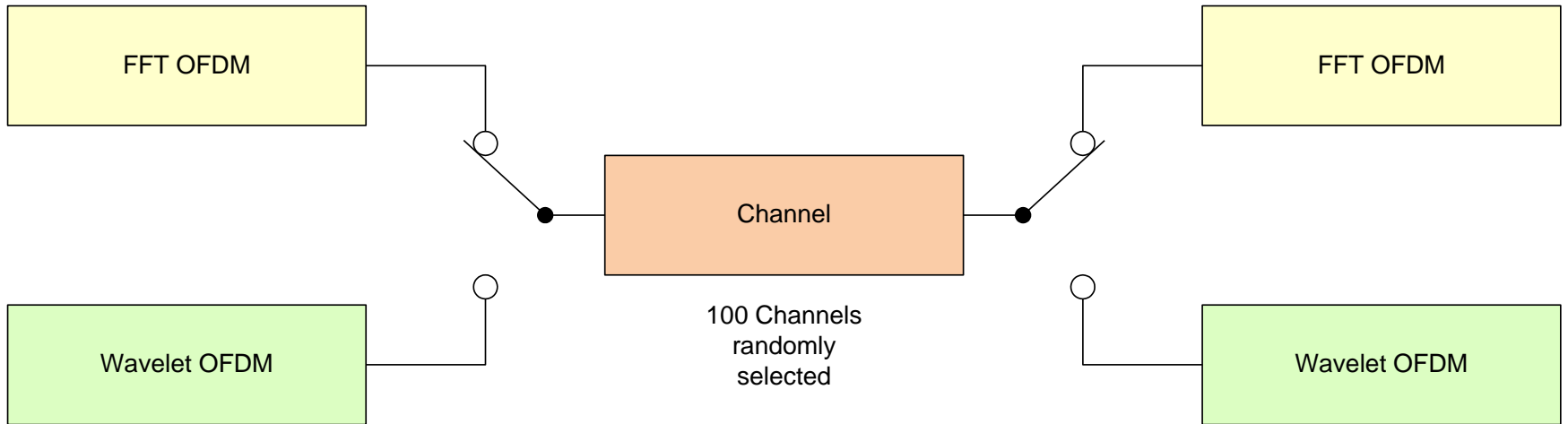
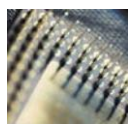
# Bandwidth-efficient notching



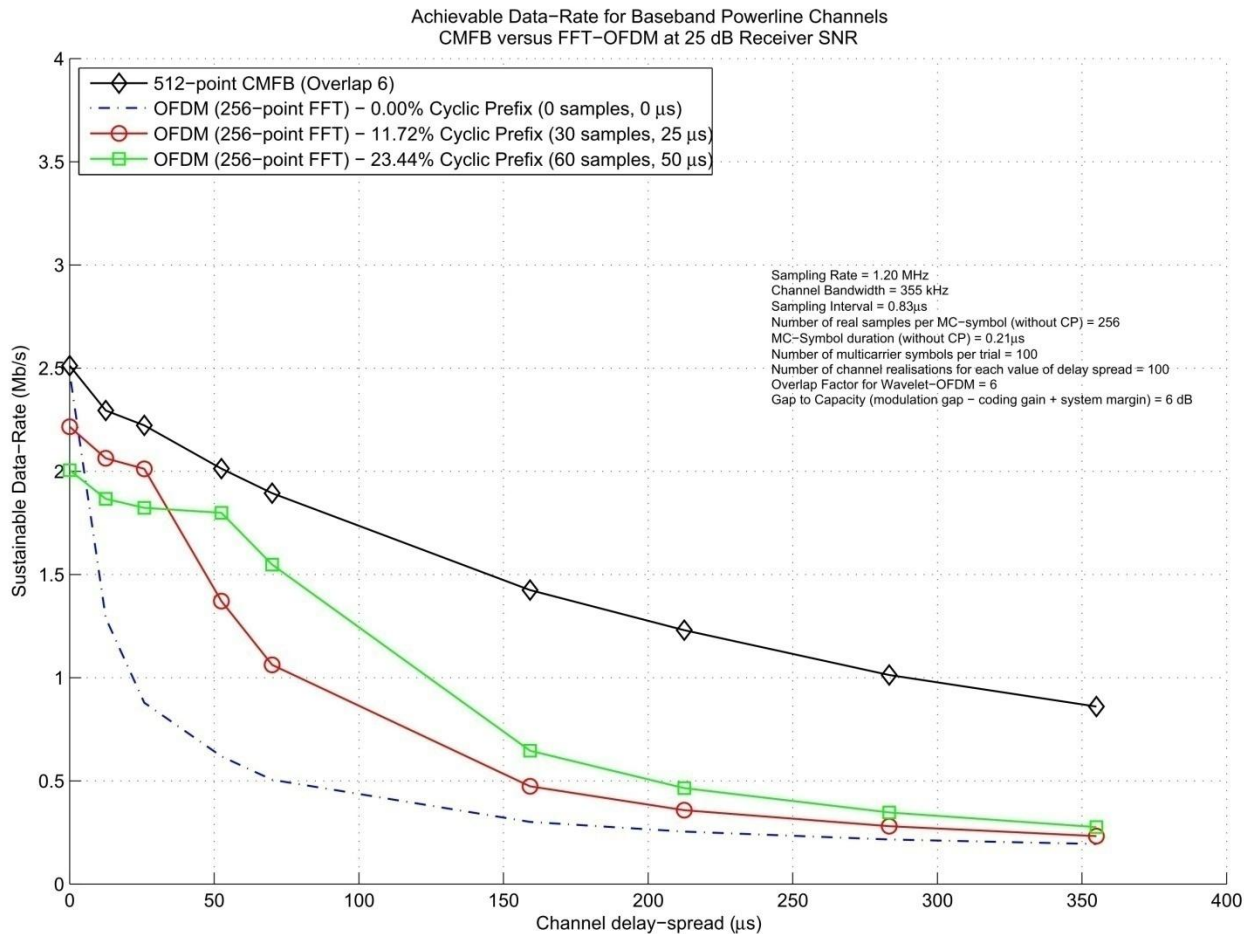


# Bandwidth-efficient frequency separation



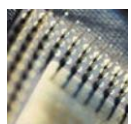


# Data rates over different channel spreads



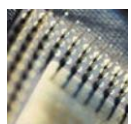


- Key success factors
  - Bandwidth-efficient notching and frequency separation
  - Achievable data rates over different channel spreads
- ➔ ■ Future extensions of the HD-PLC technology for the European market:
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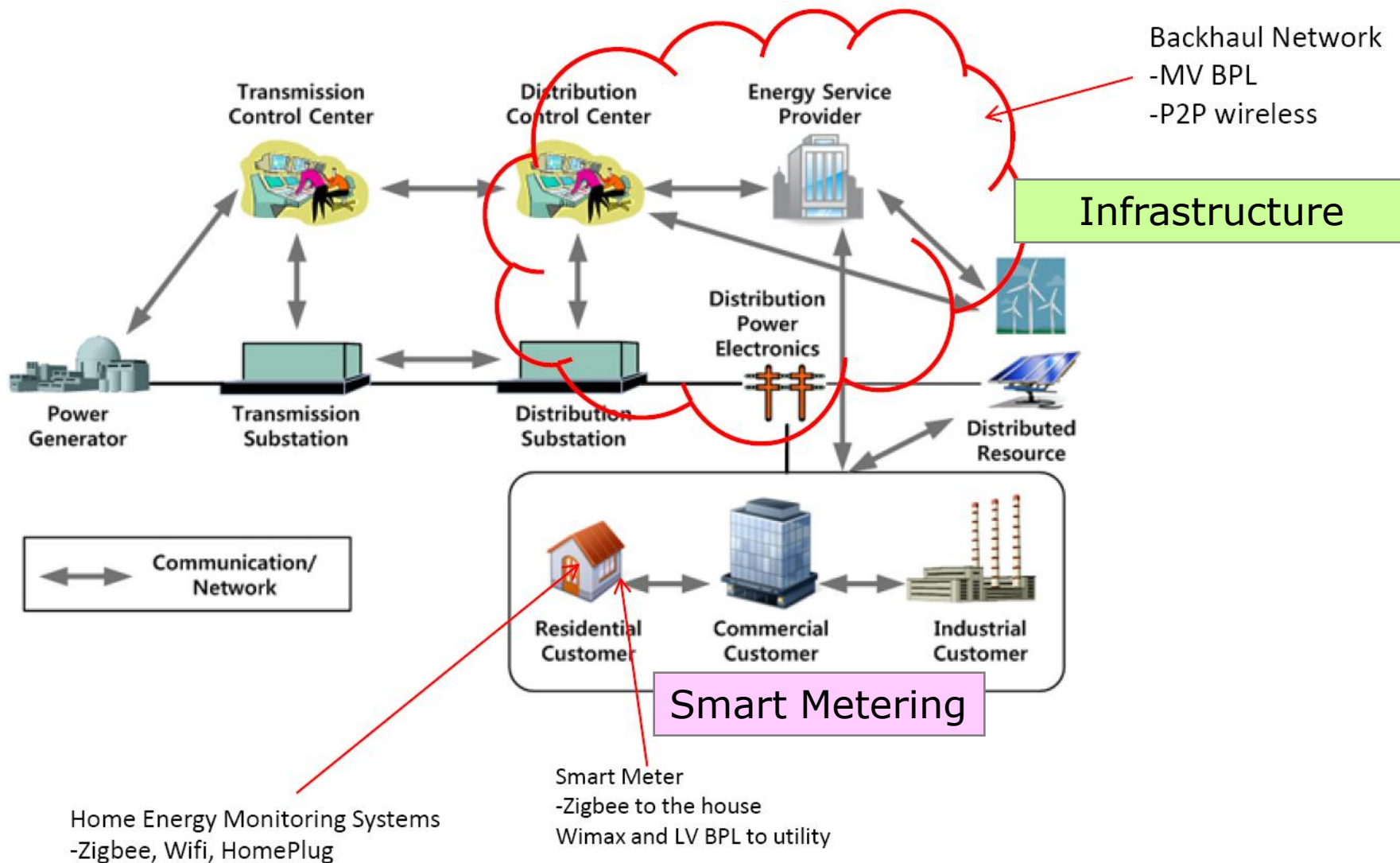
The market opportunities in Europe require the following extensions of the HD-PLC technology:

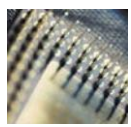
- The Smart Grid market in Europe requires because of regulation and power consumption reasons **narrowband Wavelet-OFDM** technology for meter reading.
- Advanced IPTV services in condominiums requires Wavelet-OFDM communications using **extended frequency band** (up to 60 MHz) in order to be able to provision higher data rates.



- Smart Grid is an upgrade of our existing electricity distribution grids with **intelligence, communications and control**.
- Analysts estimate that the global Smart Grid industry will be worth more than **USD 200 billion** over the next five years.
- Pike Research report (July 2010):  

The **Smart Grid communications gateway shipments** to total **276 million** through 2016, corresponding to USD 3.1 billion.





## Smart Grid communications field trials



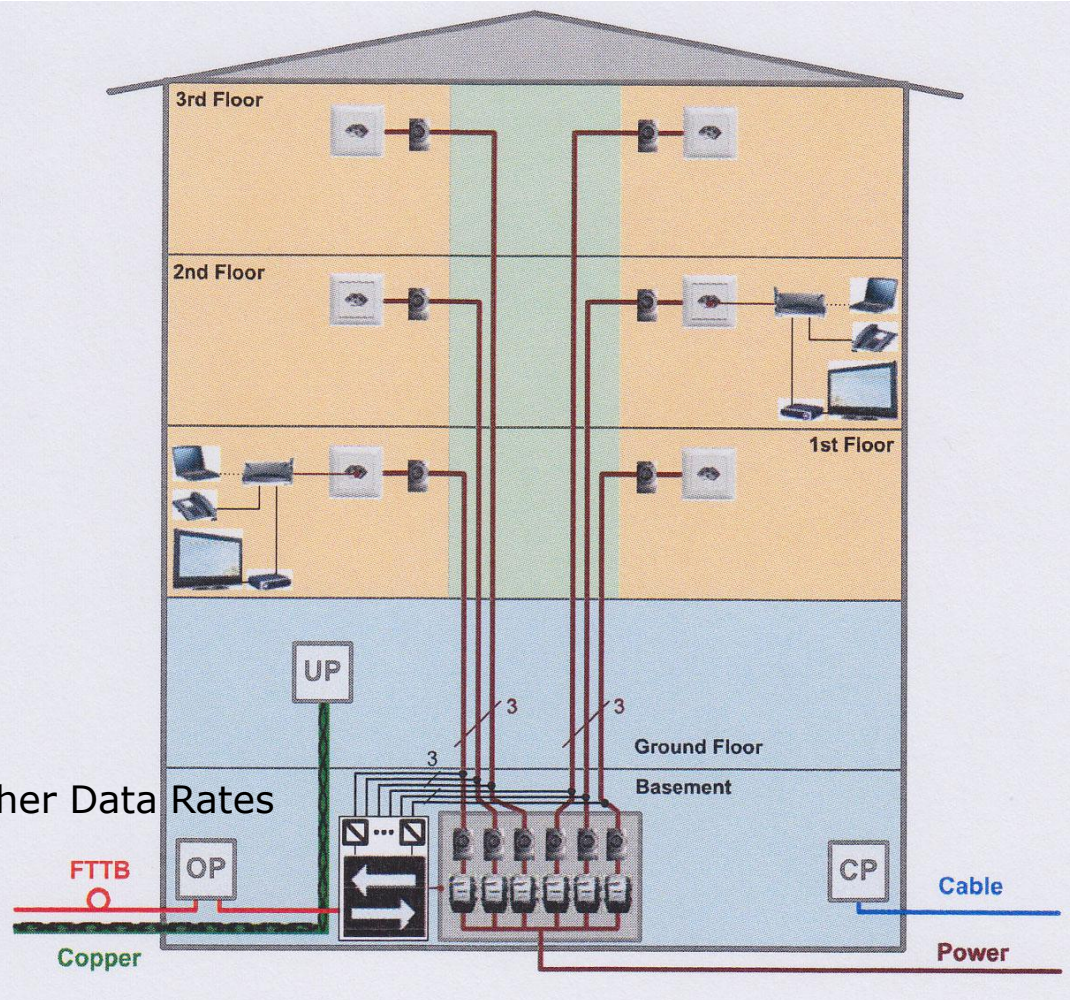


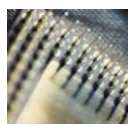
# Wavelet-OFDM communications over 2.2 km



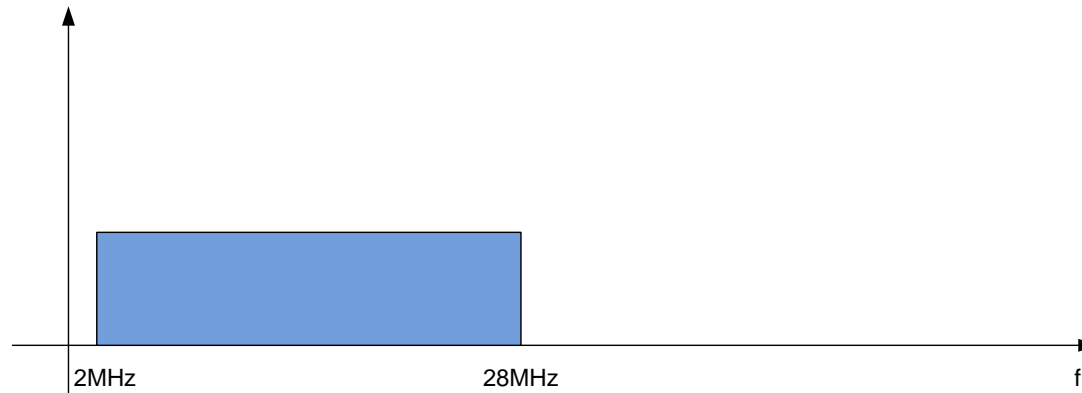
- Power meters have more than 20 dB attenuation each
- Fuses have negligible attenuation

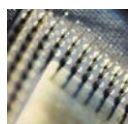
Need for Higher Data Rates



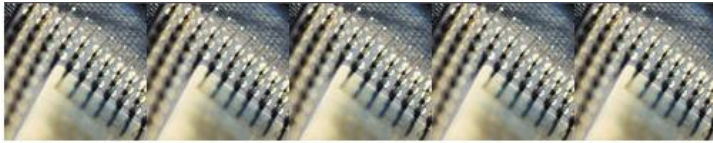


For higher data rates, the HD-PLC technology will use a larger frequency band:





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