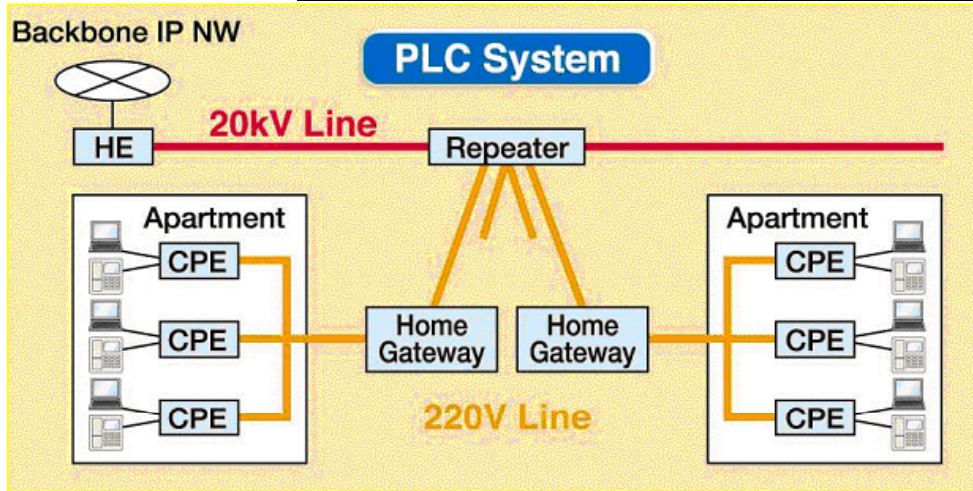


Development of PLC in Sumitomo Electric

March, 2004

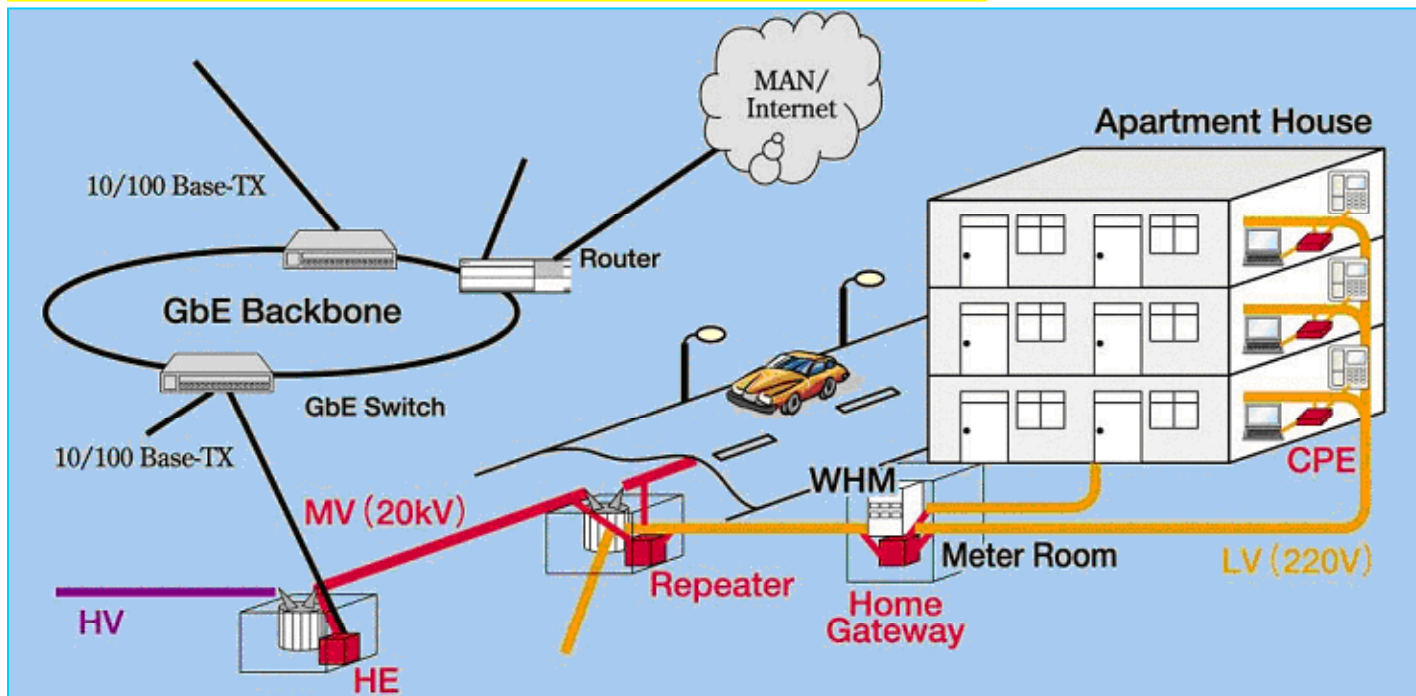
Sumitomo Electric Industries, Ltd.

Application of PLC ① (Distribution Line)



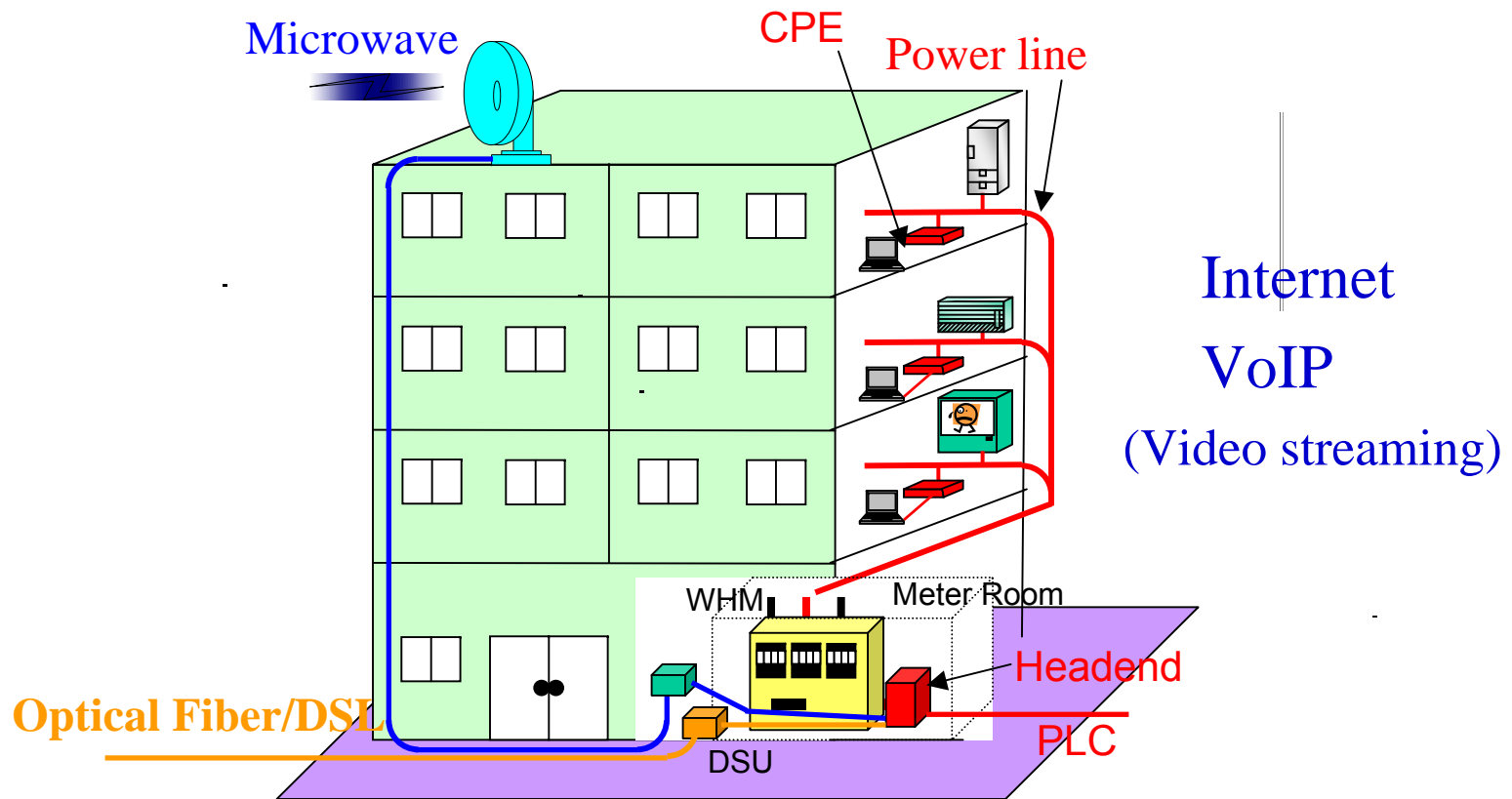
Internet
VoIP
(Video streaming)

Installation example



Application of PLC ② (In Building)

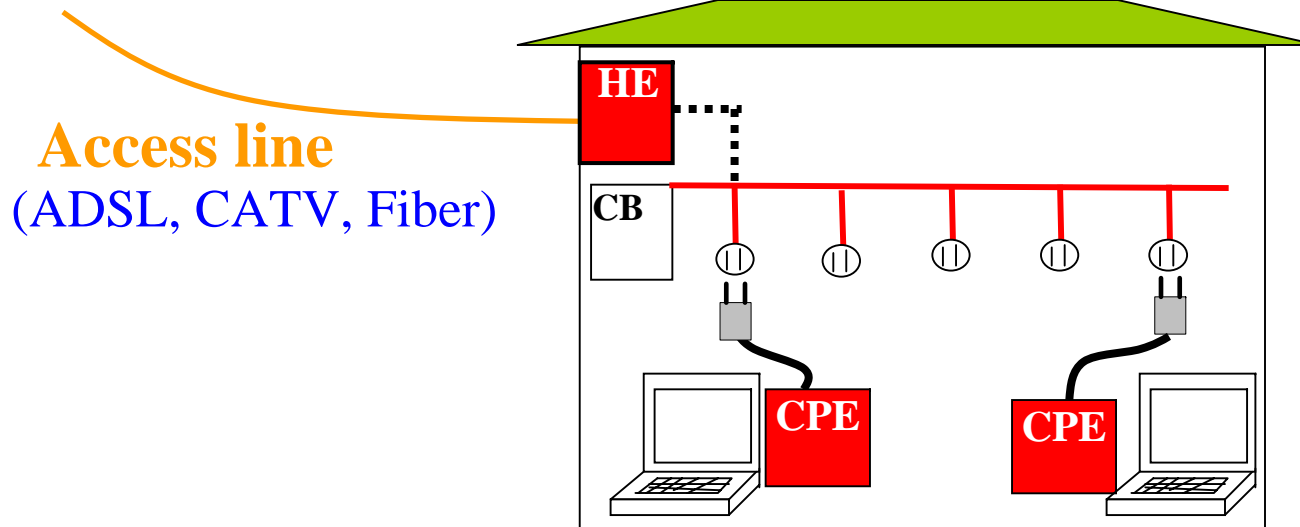
Apartment Houses / Hotel



- PLC transmits the data from the PLC, optical fiber or microwave to **each room, each plug**

Application of PLC ③ (In House)

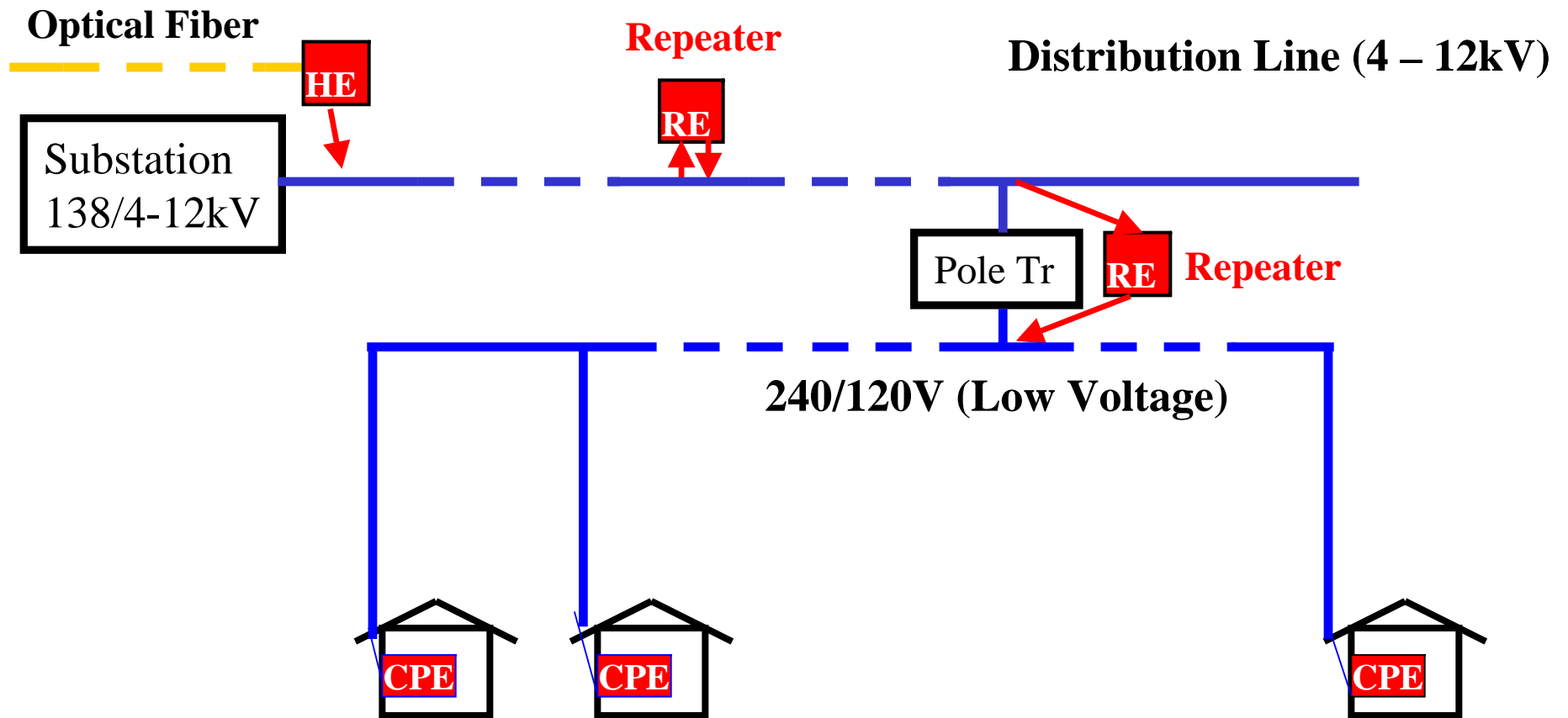
Individual House



- No need of wiring
- Home LAN** formed by PLC through ADSL or FTTH
- Home automation is available

Application of PLC ④ (Rural Area)

□ Long distant overhead line needs several Repeaters

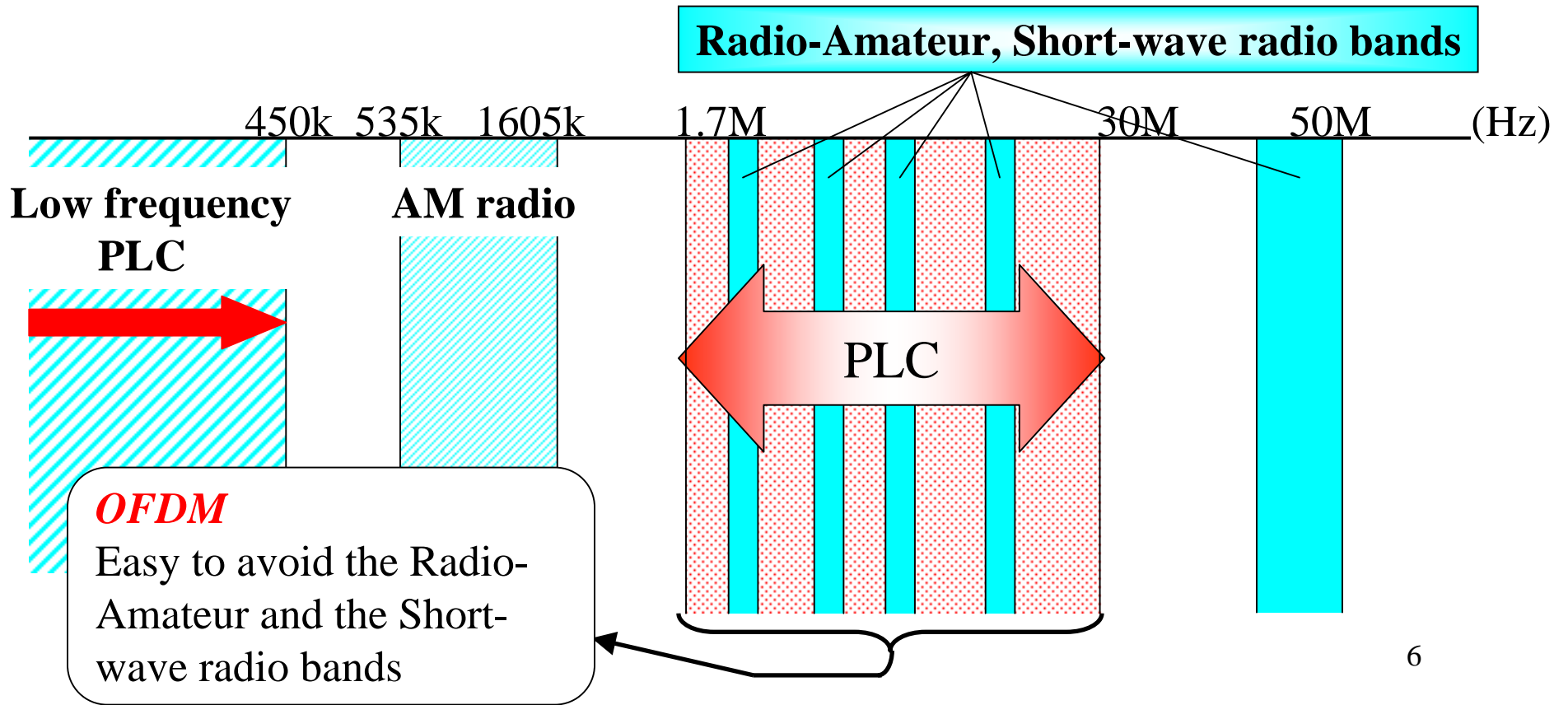


Avoidance of Interference due to Radiation

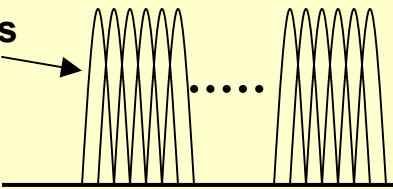
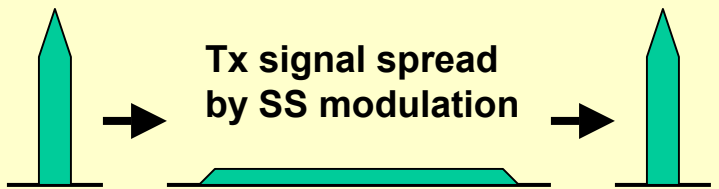
Power lines could be an antenna → electric field radiation

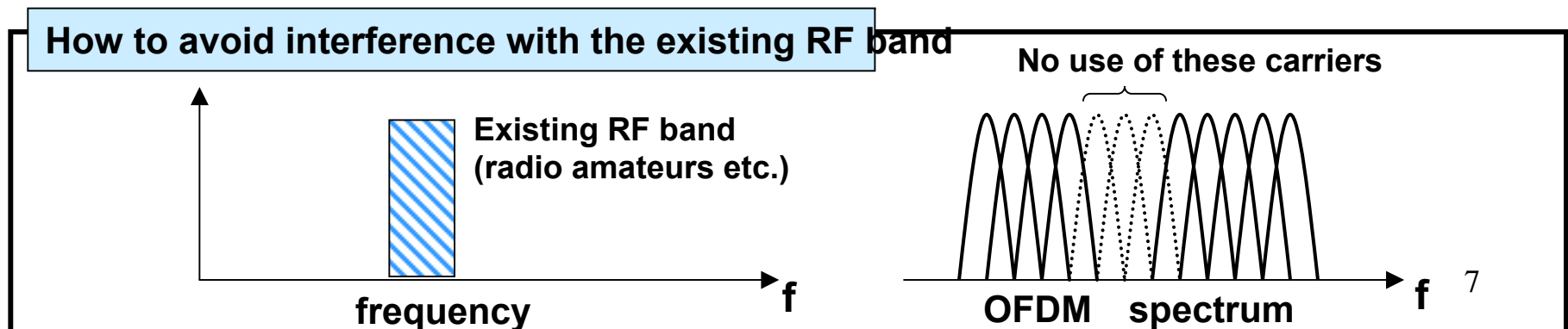


Possible interference with other wireless equipment



Power Masking with OFDM Technology

	OFDM <i>(Orthogonal Frequency Division)</i>	S S (Spread Spectrum)
Principle of Modulation	<p>Carriers </p> <p>Data stream divided in a lot of orthogonal carriers. Efficient use of frequency band → high speed transmission</p>	<p></p> <p>Tx Signal → Signal on power line → Rx Signal</p>
Avoidance of existing RF band	○ (Spectrum mask)	× (Need filters)



PLC Products Lineup (45Mbps)

Sample HE/Repeater Specification

Item	Specification
Modulation	OFDM
Number of Carriers	1280 (Programmable)
Frequency Band	2.5MHz~11.8MHz (LINK1) 13.8MHz~22.8MHz (LINK2)
Bandwidth	6.3MHz (Upstream : 2.5MHz Downstream : 3.8MHz)
Data Rate	45MbpsMax. (Upstream : 18Mbps Downstream : 27Mbps)
Multi-Access Method	TDMA—FDD
Transmission Power	-40dBm/Hz Max.

Sample VoIP CPE Specification

Item	Specification
Modulation	OFDM
Number of Carriers	1280 (Programmable)
Frequency Band	13.8MHz~22.8MHz (LINK2)
Bandwidth	6.3MHz (Upstream : 2.5MHz Downstream : 3.8MHz)
Data Rate	45MbpsMax. (Upstream : 18Mbps Downstream : 27Mbps)
Multi-Access Method	TDMA—FDD
Transmission Power	-40dBm/Hz Max.

Sample 200Mbps PLC Modem Spec

Item	Specification	
	HE, RE, HG	CPE
Modulation Method	OFDM	
Frequency Band	2 - 30MHz (Selective)	
Bandwidth	Approx. 30MHz	
Data Rate (Physical layer rate)	200Mbps Max..	
Multi-Access Method	Master Slave or CSMA	
Transmission Power	-50dBm/Hz Max.	

Desired Features of 200Mbps PLC Modem

- **Performance:**
 - Maximum speed up to 200 Mbps, thanks to:
 - High-density, high-efficiency OFDM modulation.
 - > 100 Mbps FTP transfer
 - > 25 simultaneous VoIP calls per LV transformer
 - 100% coverage in each house
- **Plug-and-Play:**
 - Ready to use out of the box (no configuration needed by end-user for normal usage).
- **Compact size/Low cost:**
 - Additional parts around a chip reduced
 - No CPU board and fan needed

- **Flexibility:**
 - Suited for **home-networking** and **access**
 - Programmable frequency bands (10, 20 or 30 MHz, from 1 to 34 MHz)
 - Supports master/slave and peer-to-peer architectures
 - Support time-division and frequency-division coexistence between access & in-home
 - Designed to work in multi-dwelling units, hotels, office buildings, airports, etc.
 - Programmable QoS architecture and strict bandwidth/latency reservation