

# BWA Network architectures

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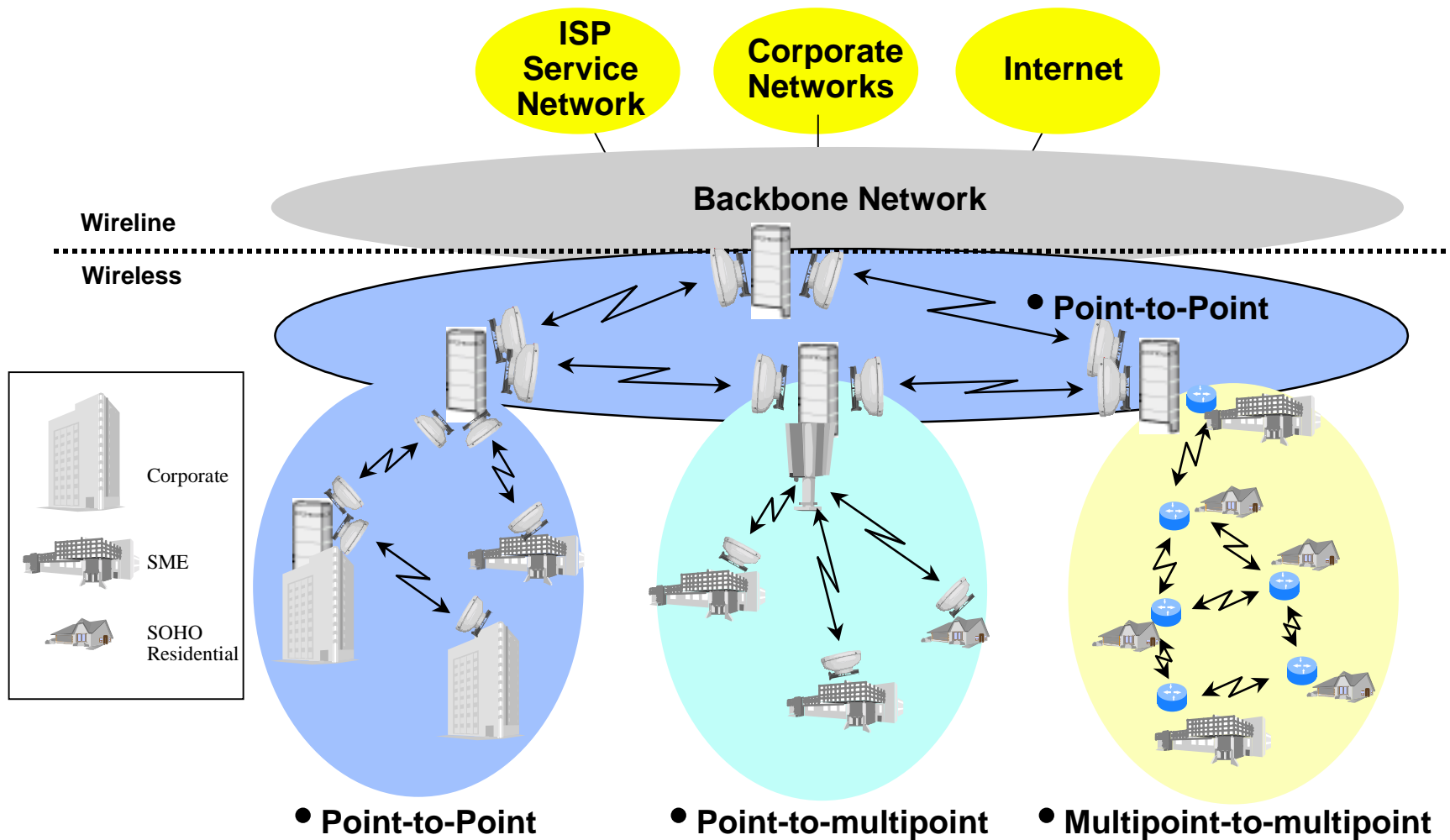
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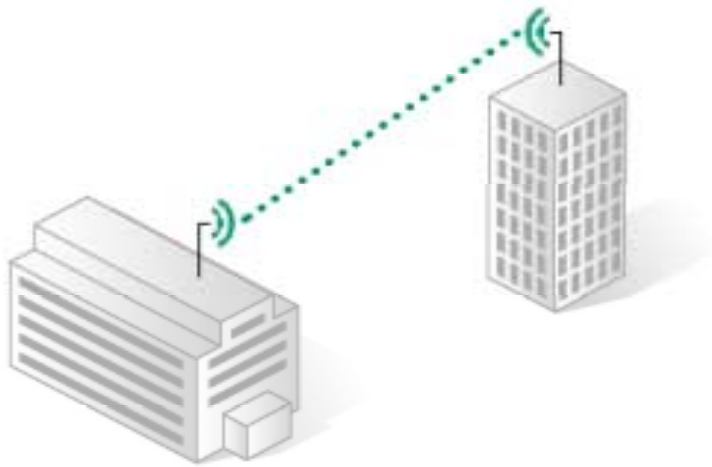
# Outline

- Why BWA?
- BWA networks
  - P-P , P-MP & MP-MP networks
  - Applications & protocols
- Conclusions

# BWA overview



# Point to point BWA

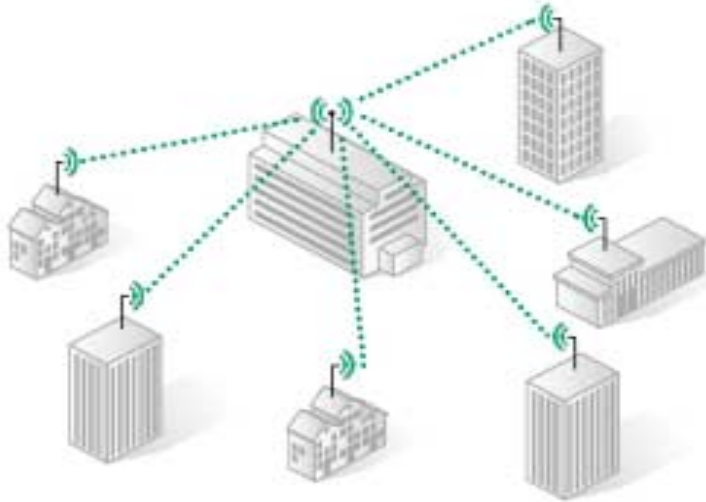


- Proprietary systems
- Long range up to 30km
- High capacities up to 155Mbits/s
- No upfront investments in equipment
- Network planning except for 58GHz short range radios
- Applications mainly circuit based

Leased lines

Backhaul for cellular and  
BWA networks

# Point to multi-point



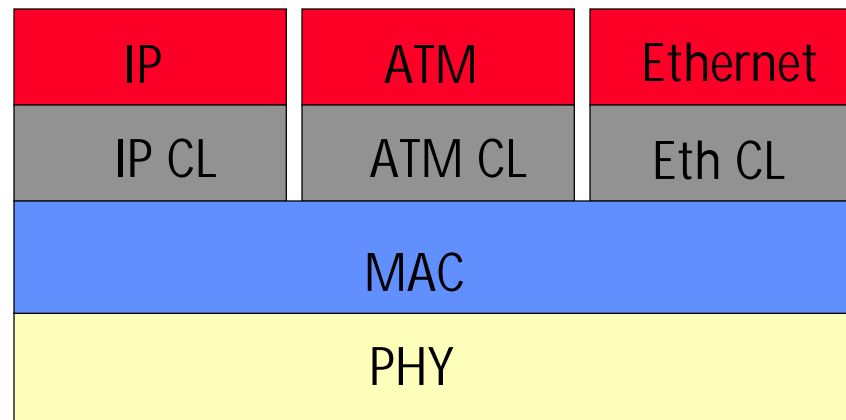
- Proprietary systems. Standards under development
- A single base station for a number of subscriber stations
- Sectorized antennas
- For metropolitan and urban areas with several customers per sector
- LMDS bands in US, 33 or 42 GHz in Europe.
- Bandwidth on demand offers significant statistical multiplexing gain in capacity for packet services

# Applications for PMP

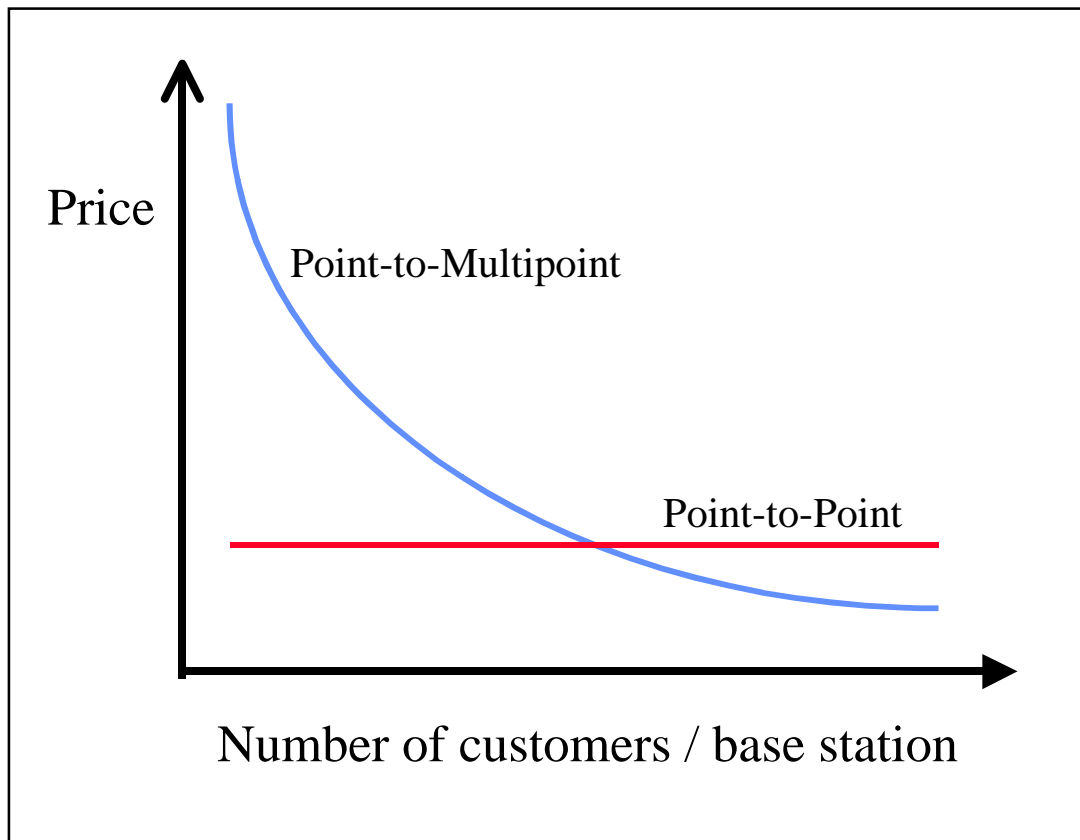
- Corporate customers, s
  - Leased lines e.g. E1/T1
  - LAN interconnection
  - IP VPN access
- Residential multi-dwelling units
  - Internet access
  - VoIP
  - Multimedia services
- Cellular transmission
  
- PMP radios are a true service convergence platform!

# PMP radio protocol stack

- Similar stack adopted in IEEE 802.16 TG1 and ETSI/BRAN/HA
- Regardless of 'payload' protocol the air interface is connection oriented
- This allows higher efficiency and QoS control



# Cost of PMP vs PP



Intersection point is affected by

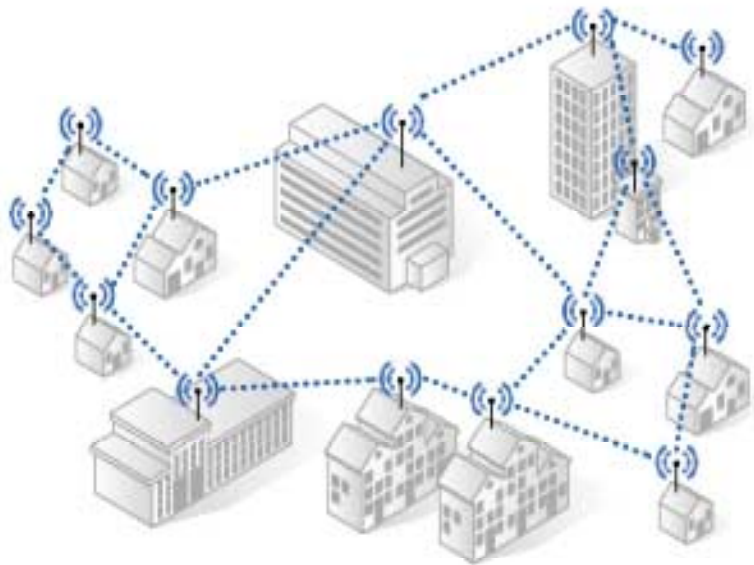
Equipment costs

Site costs

Licence costs



# MP-MP BWA networks



Technologies

Nokia RoofTop Wireless Routers

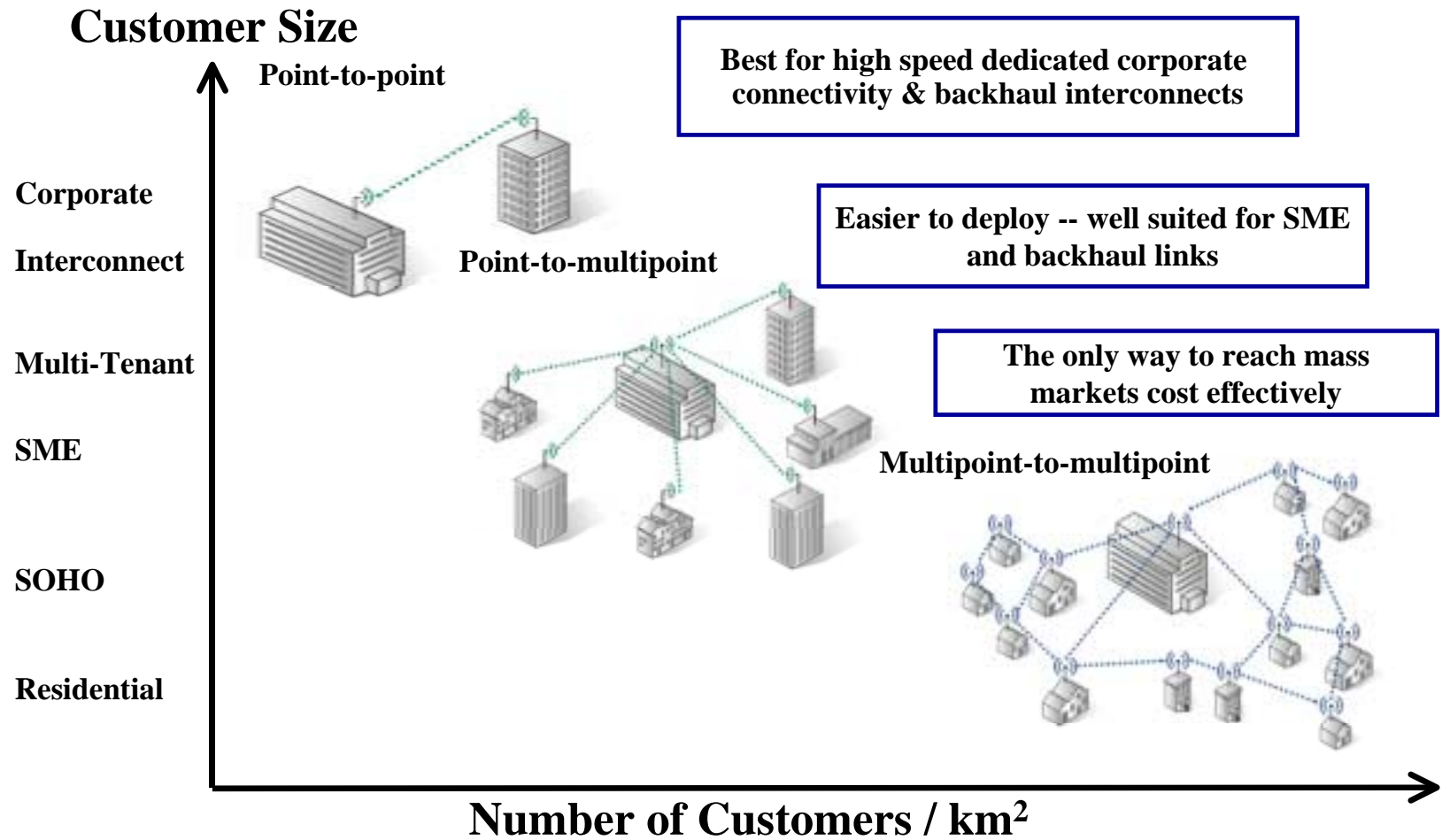
Applications

IP access including VoIP

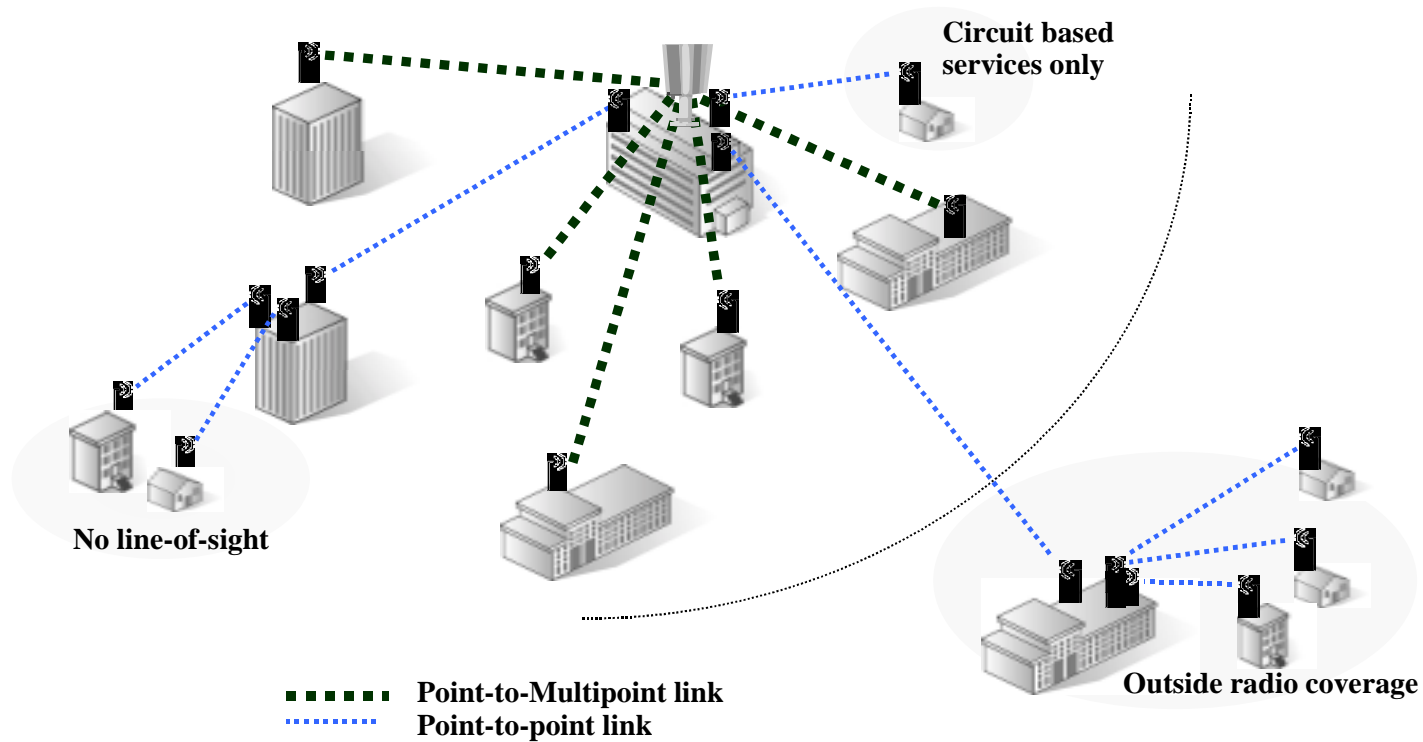
Easy deployment. Little upfront investment. Customers install their own radios.

LOS required only to a neighbouring terminal.

# Positioning



# Combining PP and PMP



- Combining PMP and PP can be combined for extended range and overcoming LOS problems
- PP attractive backhaul for PMP systems

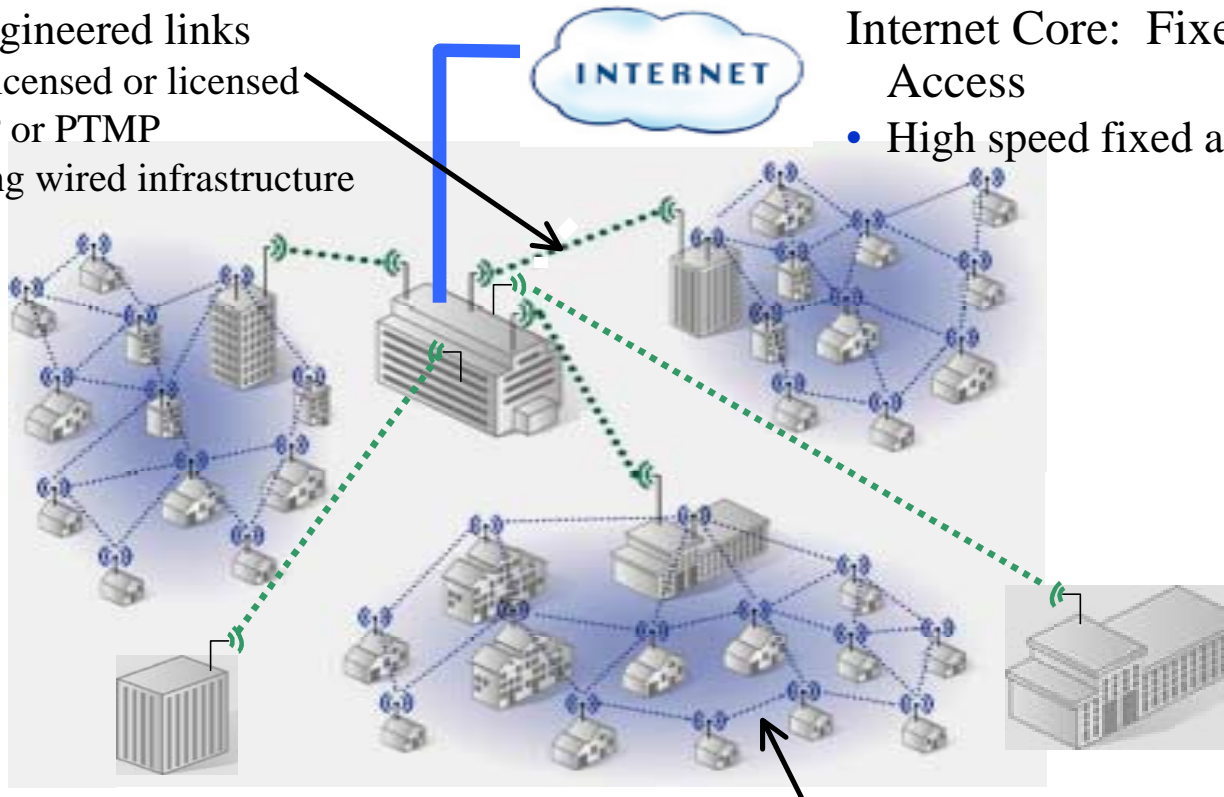
# Nokia MP-MP solution

## Metropolitan Area: High Speed Edge

- RF engineered links
  - Unlicensed or licensed
  - PTP or PTMP
- Existing wired infrastructure

## Internet Core: Fixed Wired Access

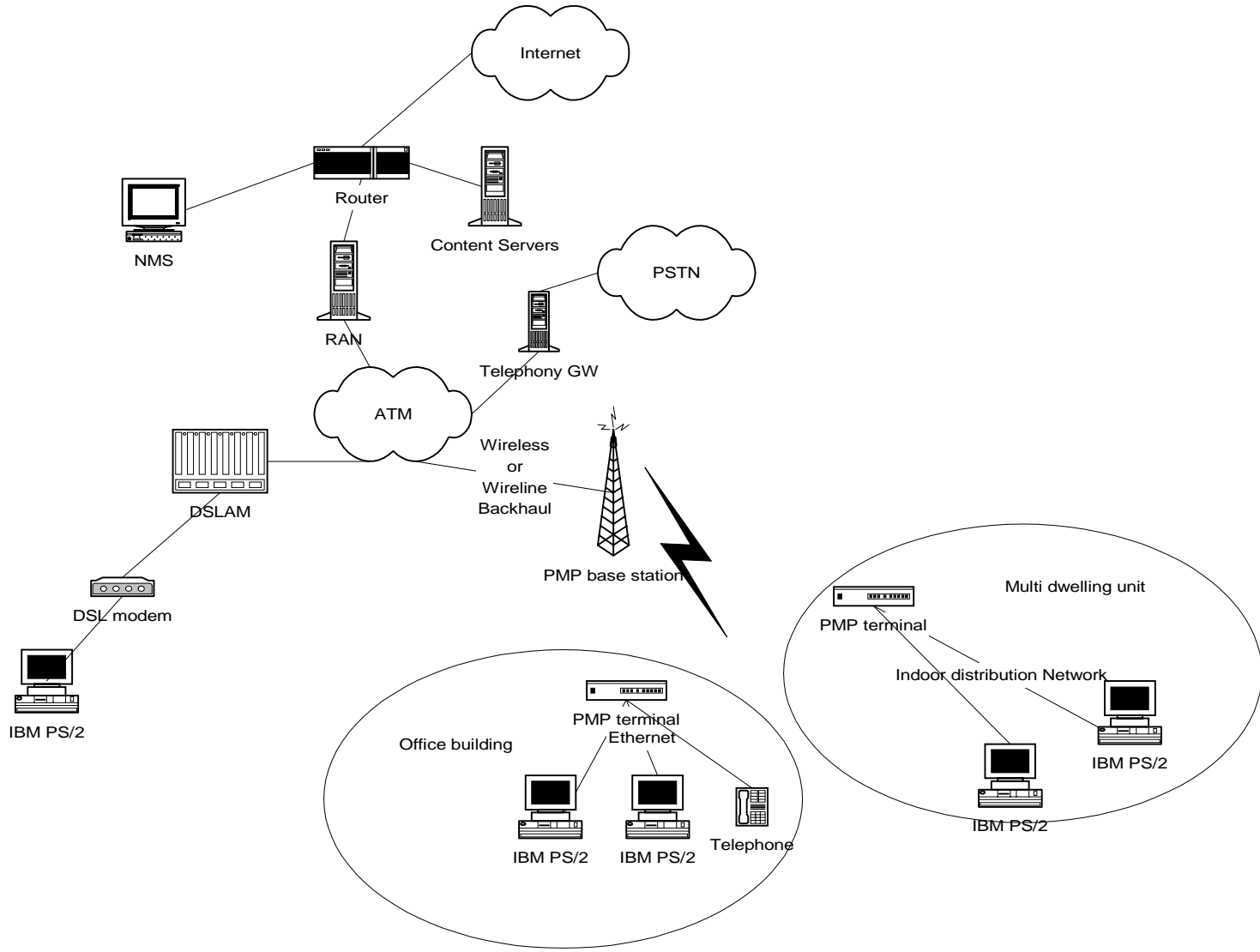
- High speed fixed access points



## Neighborhood: Ad-hoc Routed Mesh Networks

- MP-to-MP, Unlicensed RF

# WBA + xDSL



# Conclusions

- Typically more than one network technology involved in BWA network
- No 'one size fits all' technology.
- Multiple applications and protocols are run simultaneously in the network
- BWA networks are not only a competing technology to other access technologies such as xDSL. It is also a complementary technology!
- For multidwelling residential users BWA turns the 'last mile' issue to a last 300' issue'