EHB 453, Introduction to Mobile Communications

Lecture 10: Drivers of Convergence

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Outline

- Network Convergence
- Service Convergence
- Device Convergence
- More Coverage
- More Capacity
- More Access
- More Free Spectrum

Network Convergence

- Scenario 1: Common Billing and Customer Care
- Scenario 2: Access to the Internet
- Scenario 3: Access to the Home 3GPP/2 Services
- Scenario 4: Session Continuity
- Scenario 5: Access to the CS Services

Converged Networks

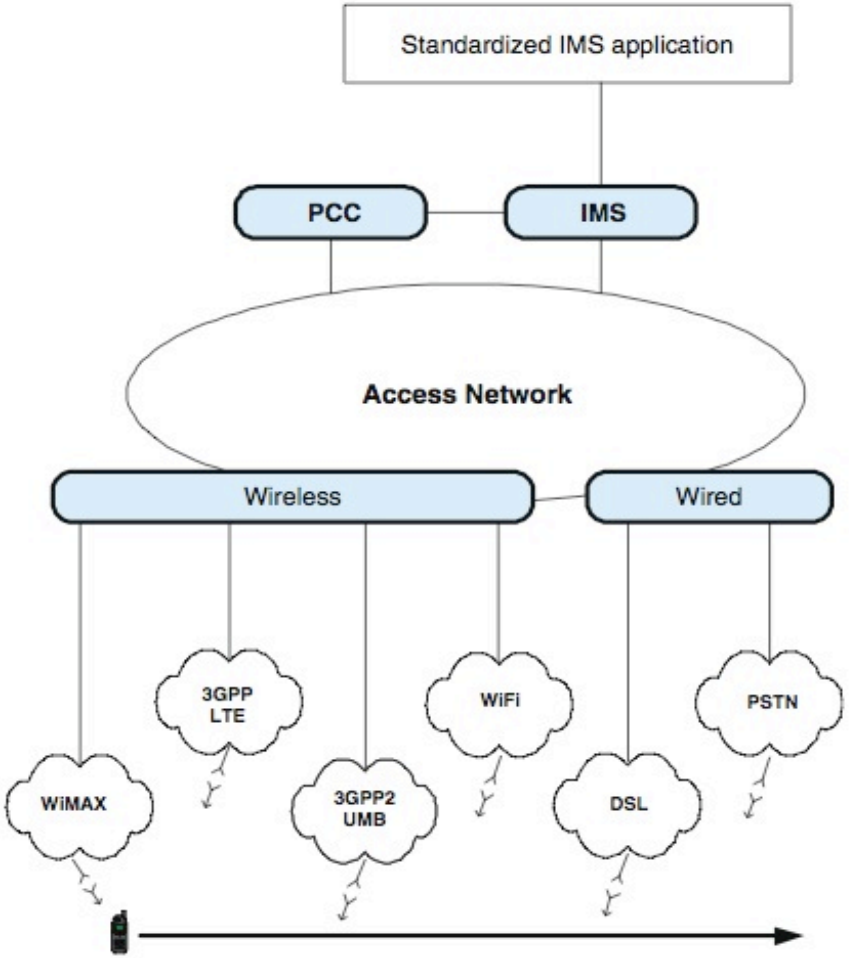


Fig. 13.1 Convergence networks

LTE interworked with WiMAX and HRDP

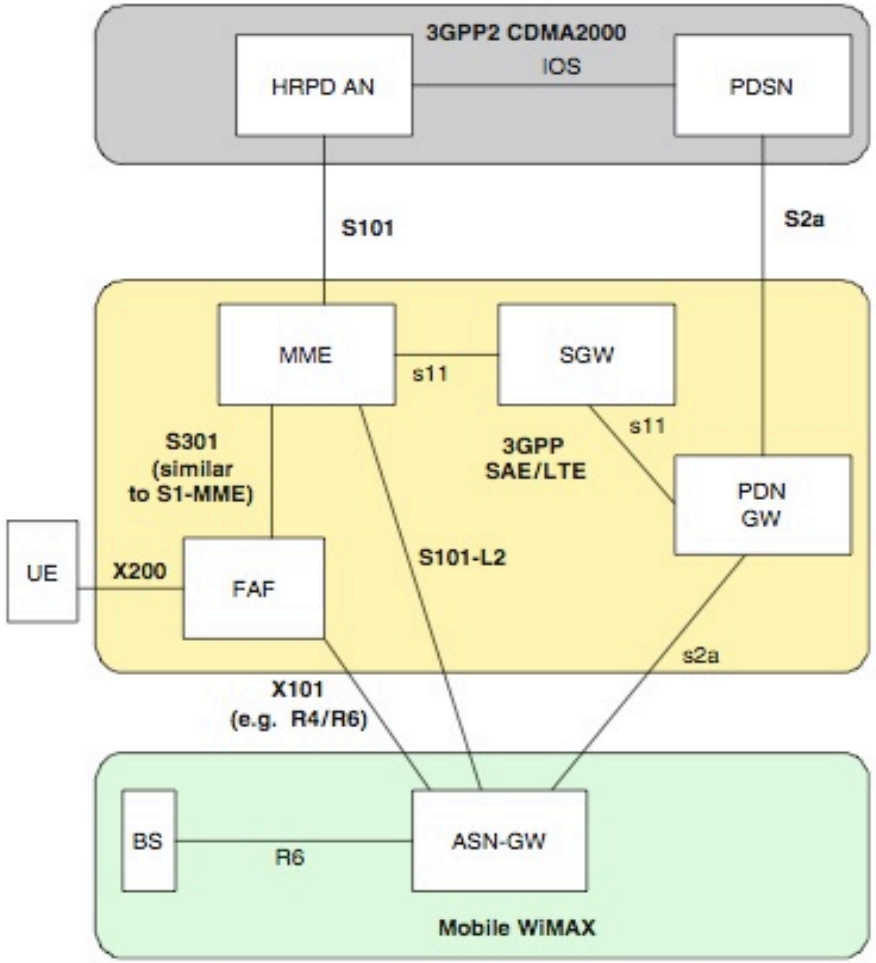


Fig. 13.2 LTE interworking with WiMAX and HRPD: X101 reference point may be based on R4 or R6 of WiMAX reference points

WiMAX internetworking with 3GPP

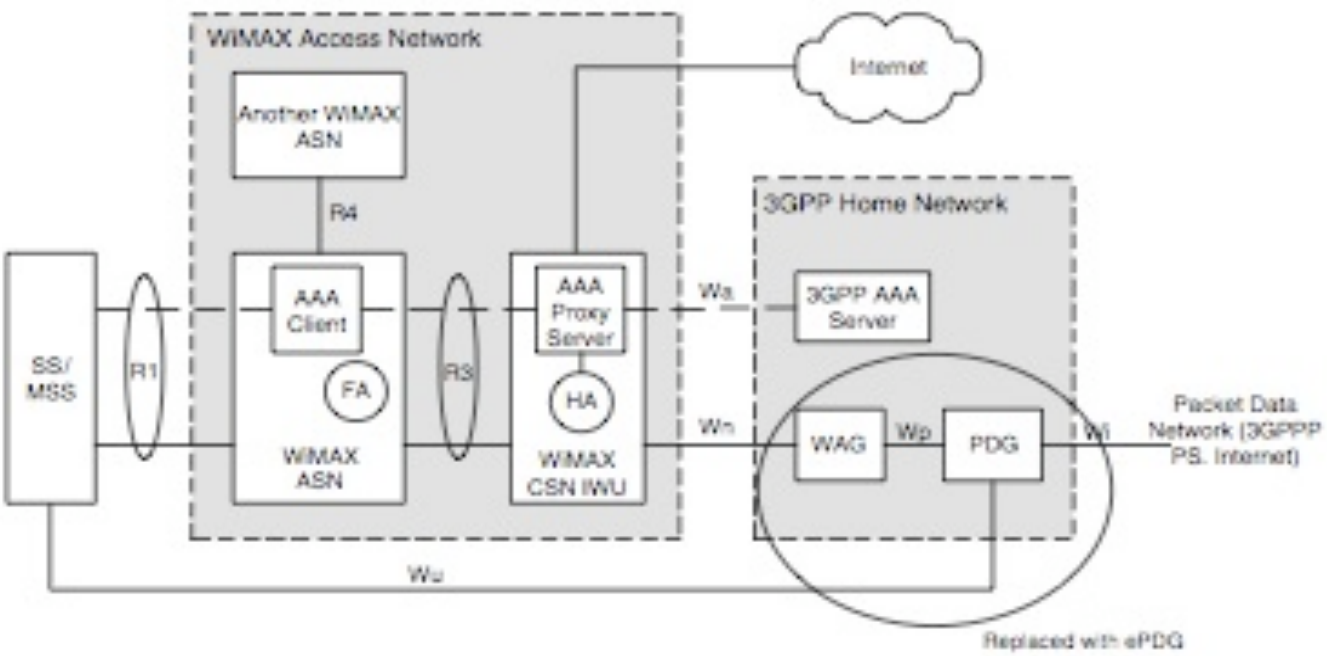


Fig. 13.4 WiMAX-3GGP interworking for nonroaming case

WiMAX internetworking with DSL

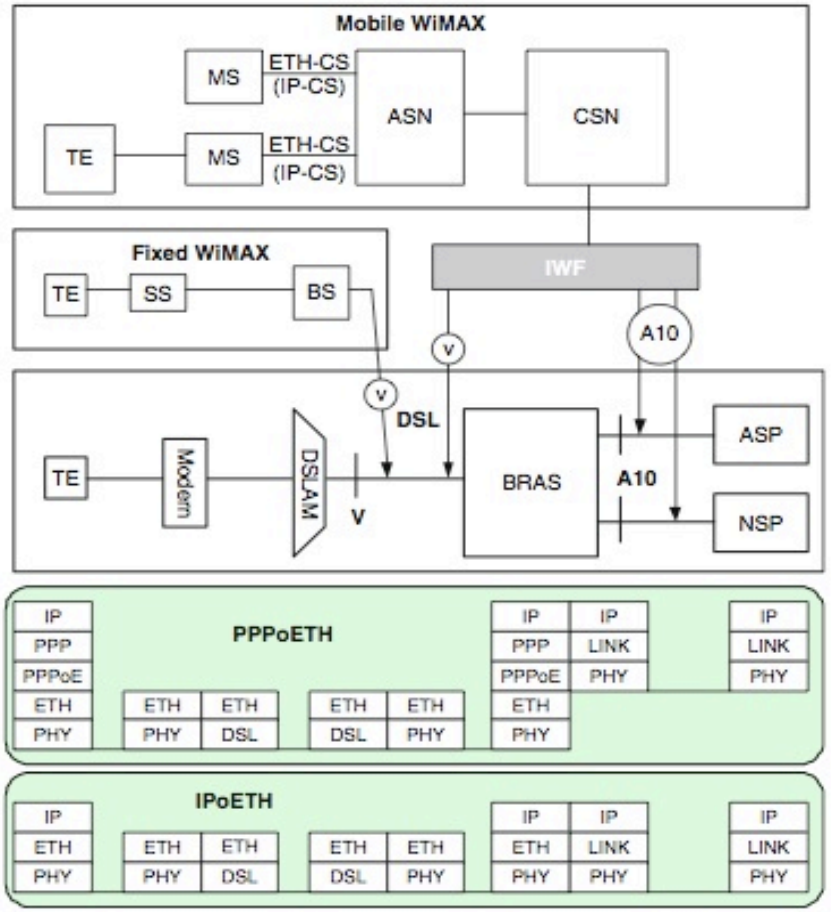


Fig. 13.5 DSL reference architecture: T interface is between terminal equipment and DSL modem in customer premises. V interface is Ethernet aggregation in the access network. A10 interface is between the access network and service providers. This interface connects to Application Service Provider via A10 ASP or Network Service Provider via A10 NSP

GAN (UMA)

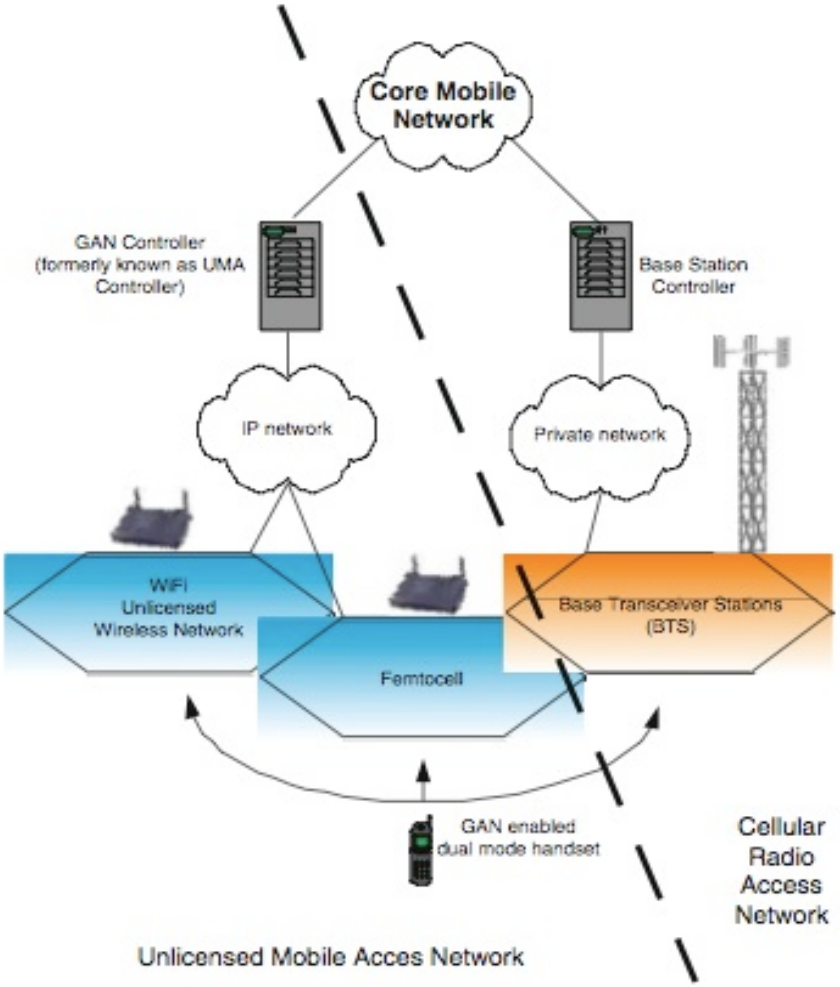


Fig. 13.6 UMA

GAN

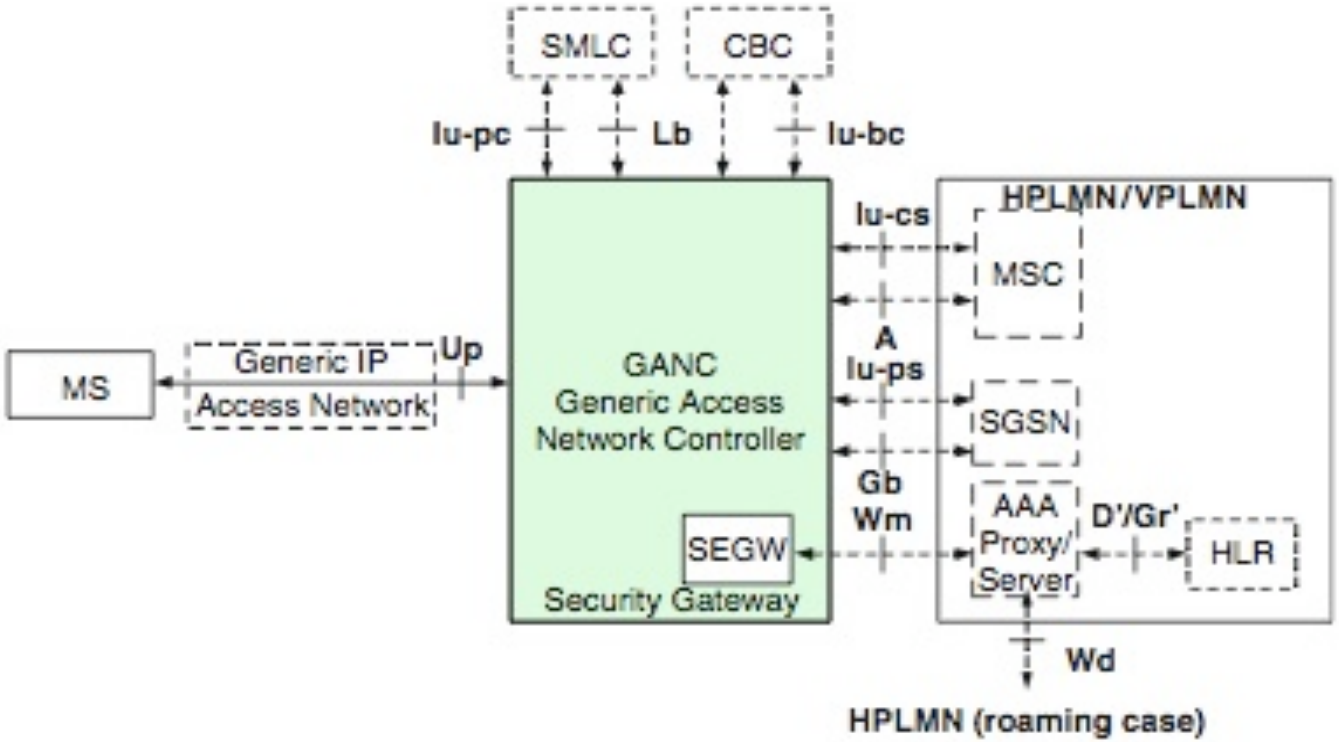


Fig. 13.7 UMA (source: TS 43318-800)

Seamlessness with IEEE 802.21

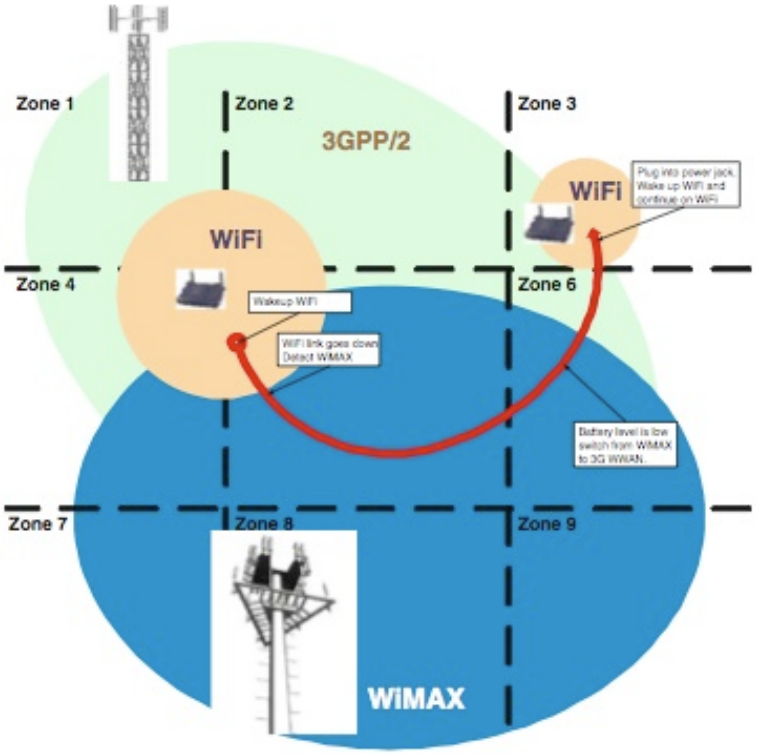


Fig. 13.8 IEEE 802.21 Scenario

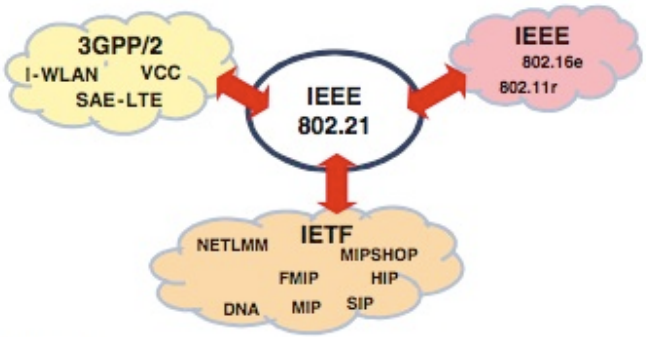


Fig. 13.9 IEEE 802.21 framework

IEEE 802.21

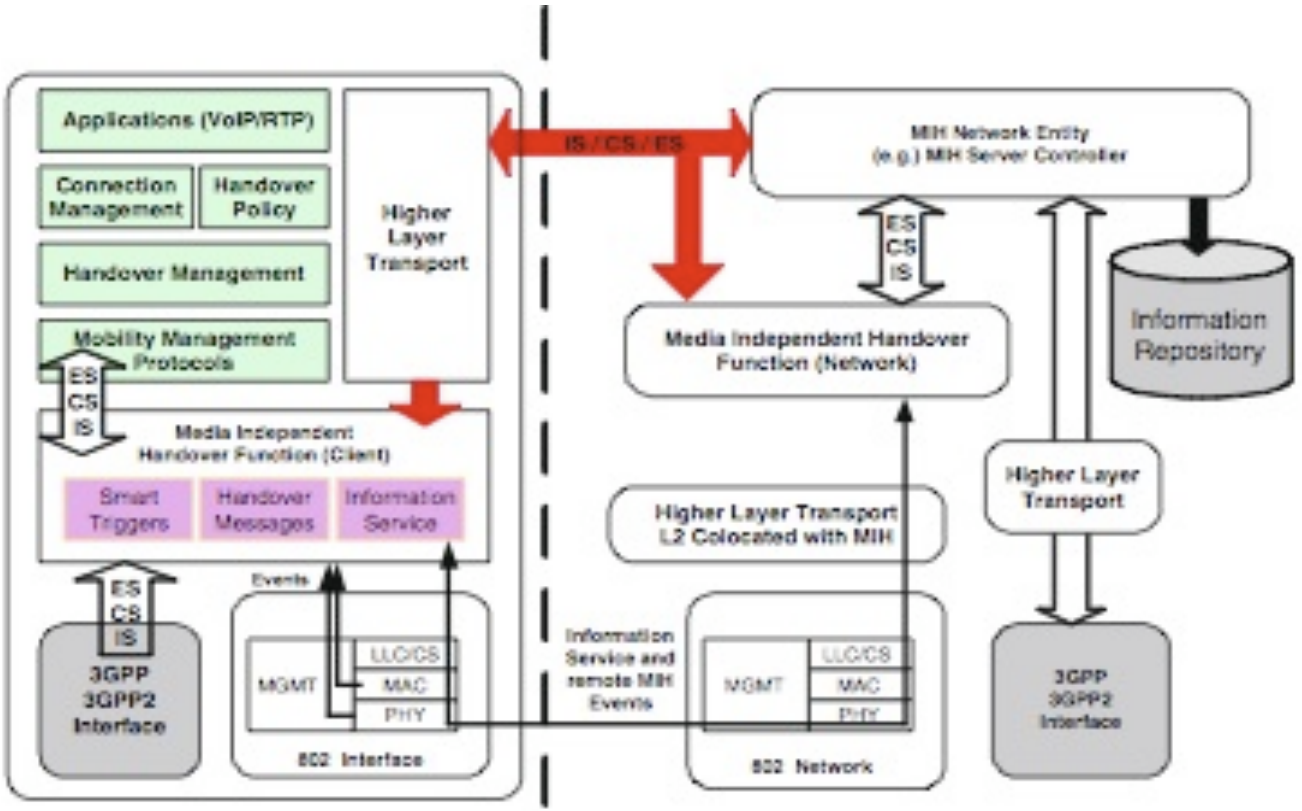


Fig. 13.10 IEEE 802.21 services: IEEE 802.21 has certain media-specific amendments to 802.11u (describes interwork with external networks), 802.16g, 3GPP-SAE, and IETF. Abbreviations in the figure are as follows: IS stands for Information Service, CS stands for Command Service, ES stands for Event Service, and LLC stands for Logical Link Controller

Service Convergence

- One Policy Control and Chargeing

PCC

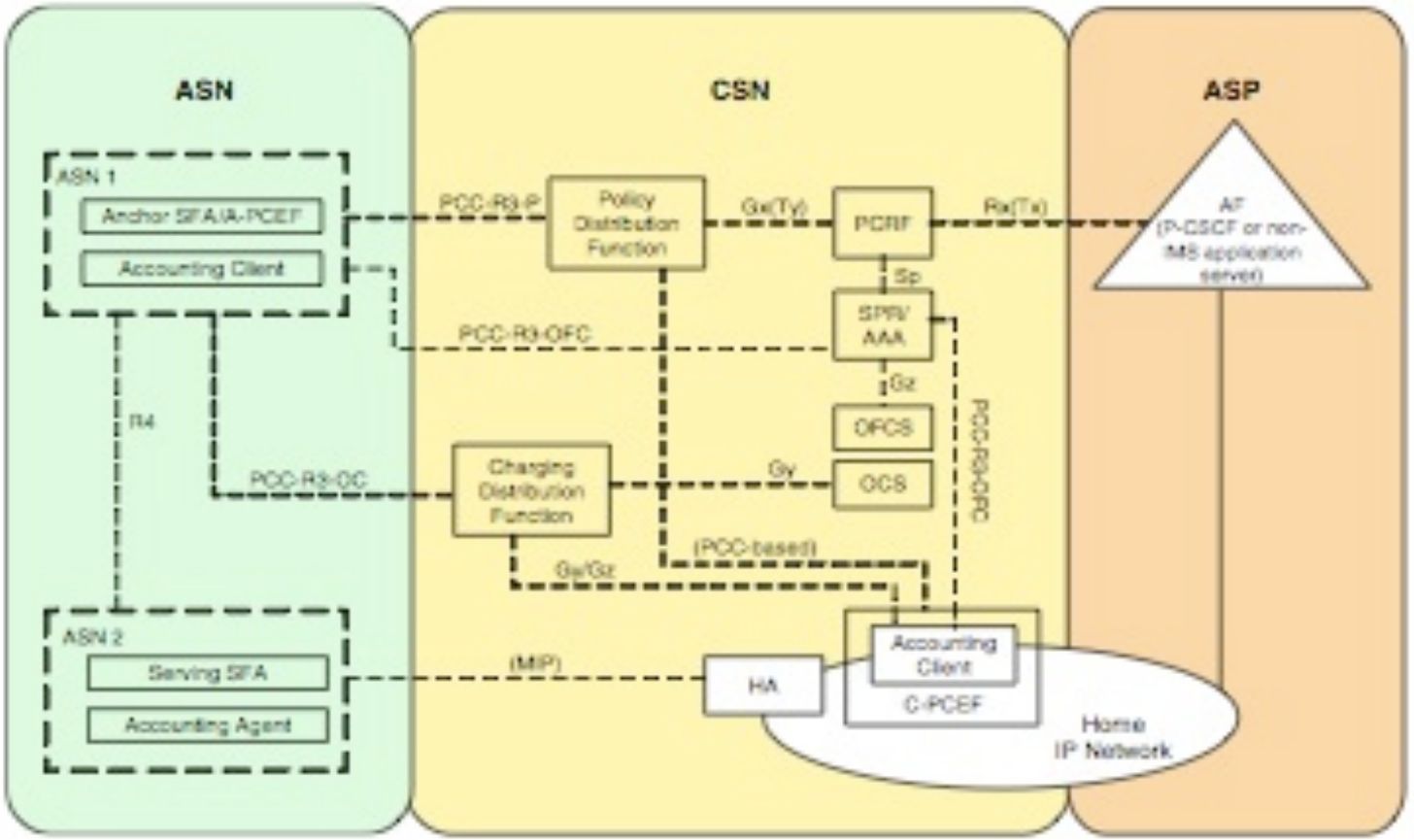


Fig. 13.11 PCC architecture

One IMS

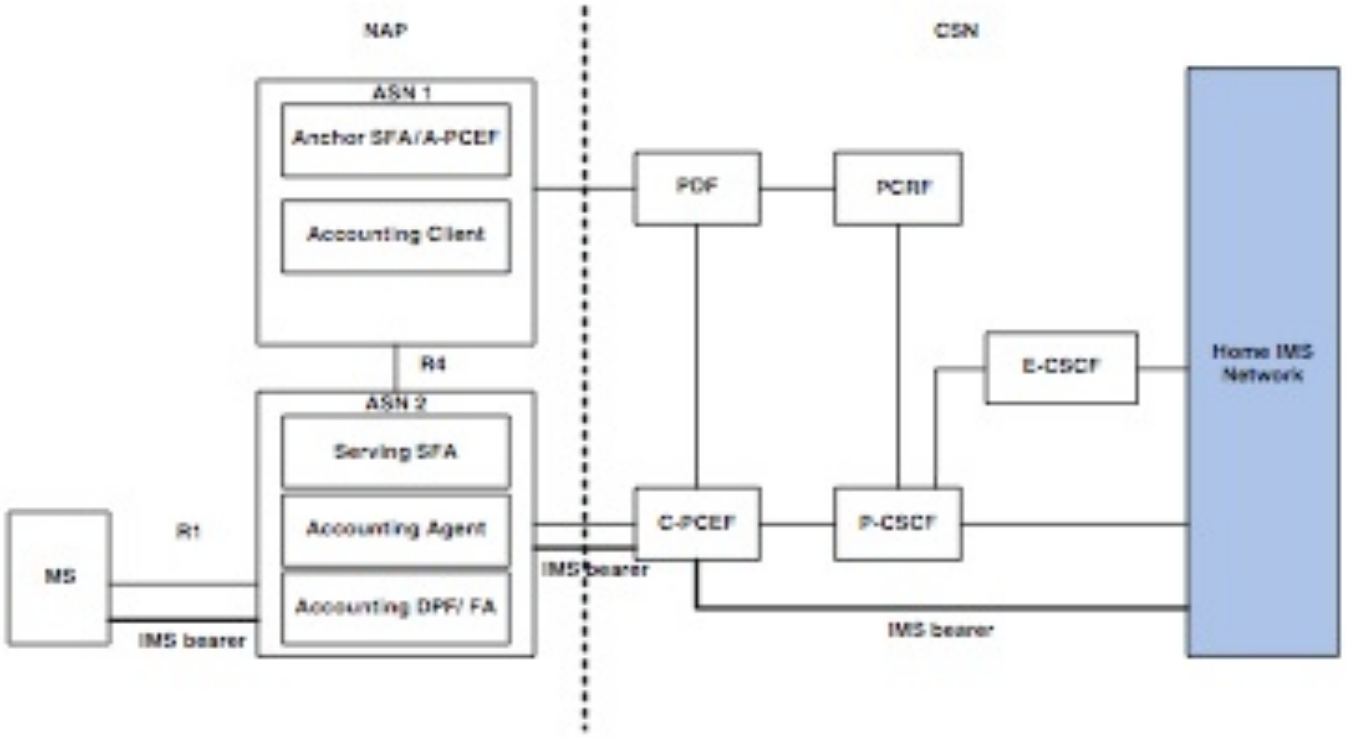


Fig. 13.12 Nonroaming reference model

Device Convergence

- OHA
- OBSAI
- ATCA

Fig. 13.13 ATCA chassis and blades

More Coverage with IEEE 802.16j

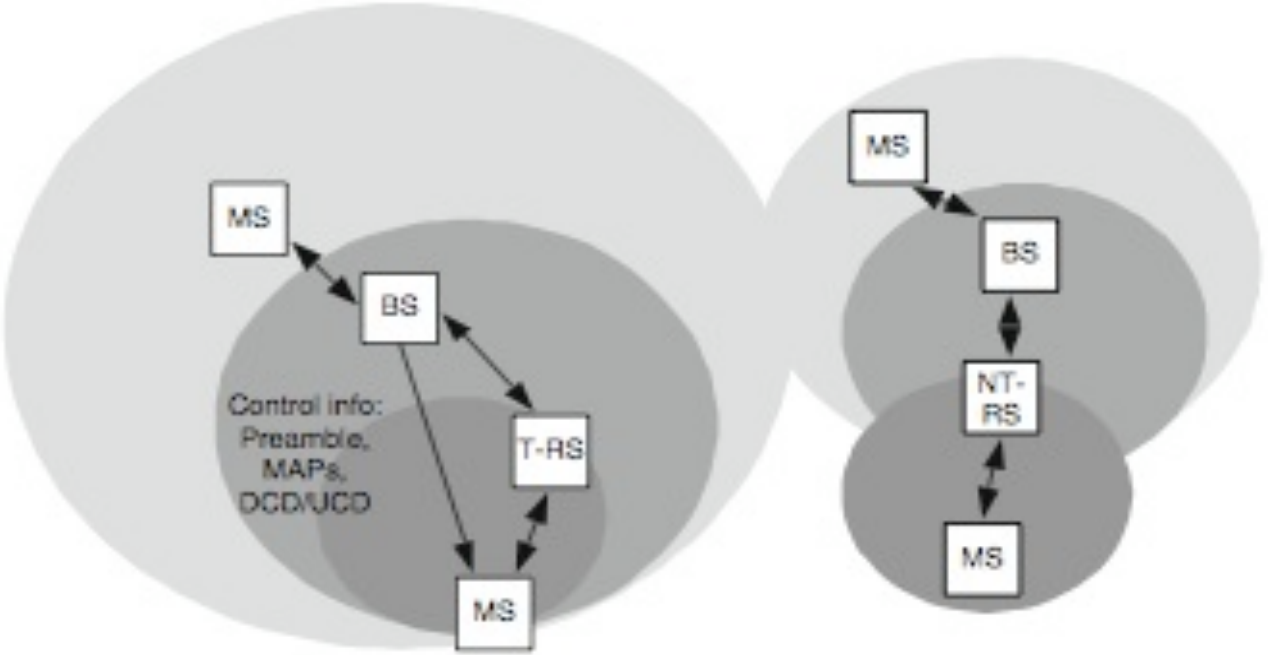


Fig. 13.14 Relay modes for IEEE 802.16j

IEEE 802.16j frame

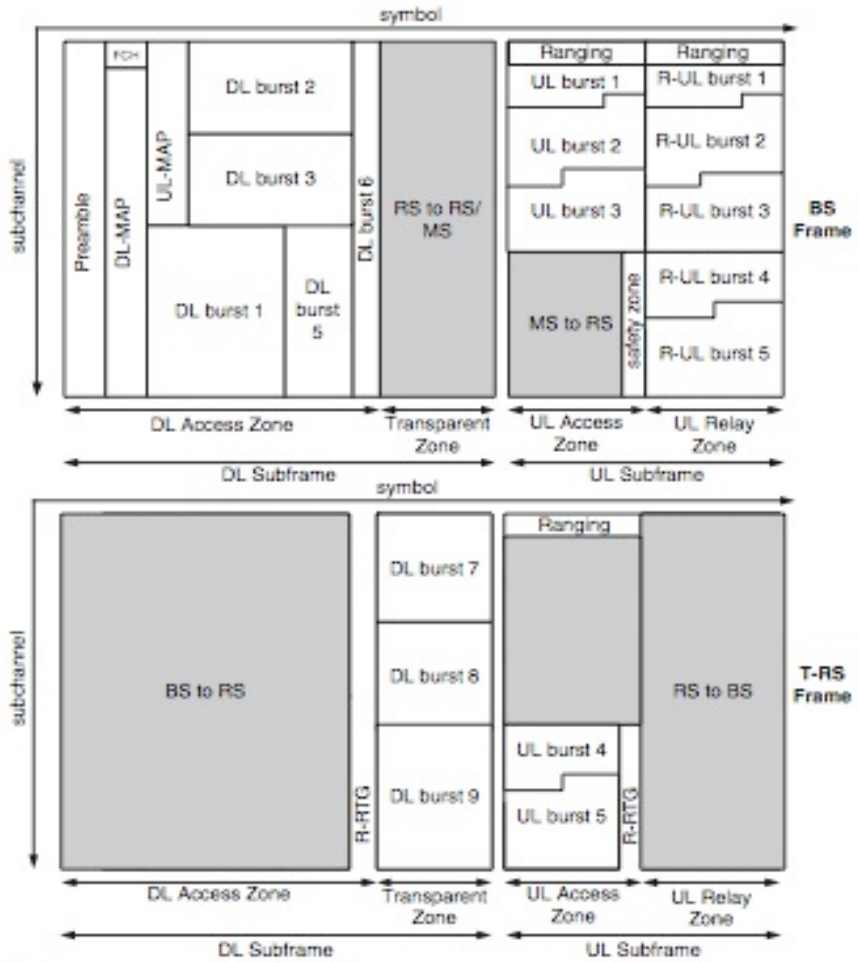


Fig. 13.15 Transparent relay mode frame structure

More Capacity with IEEE 802.16m

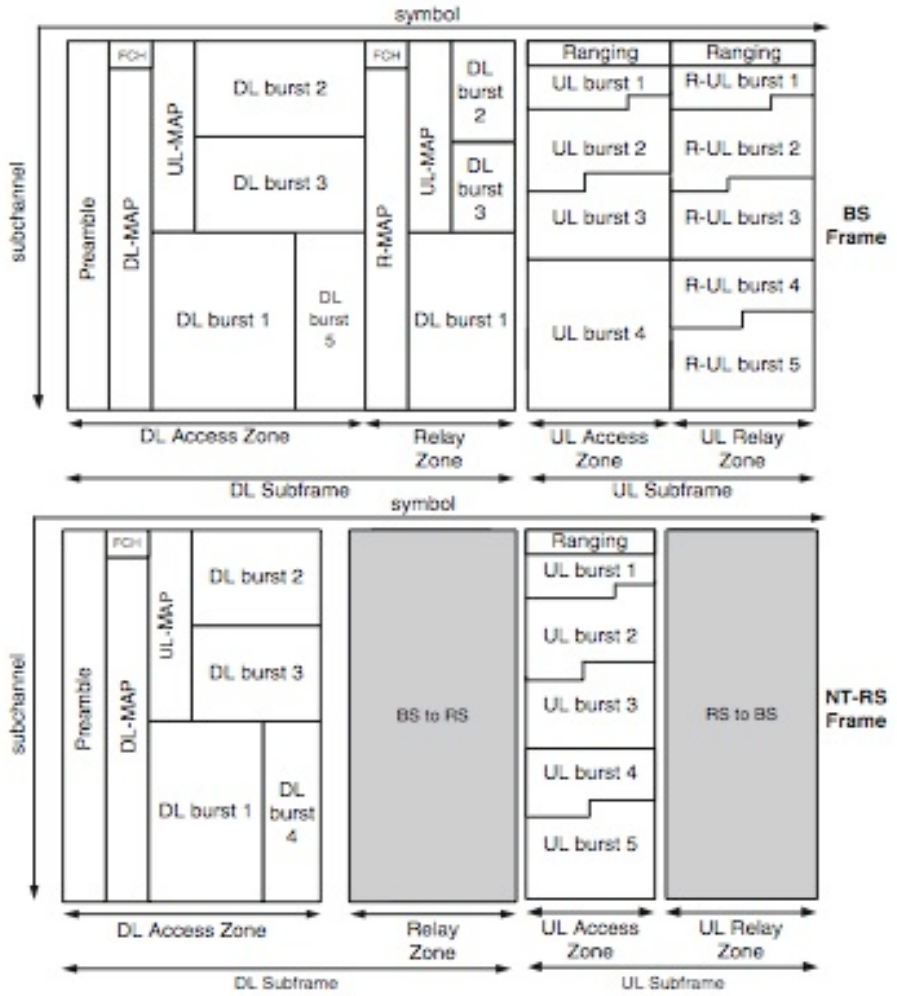


Fig. 13.16 Nontransparent relay mode frame structure

Frame structures for IEEE 802.16m

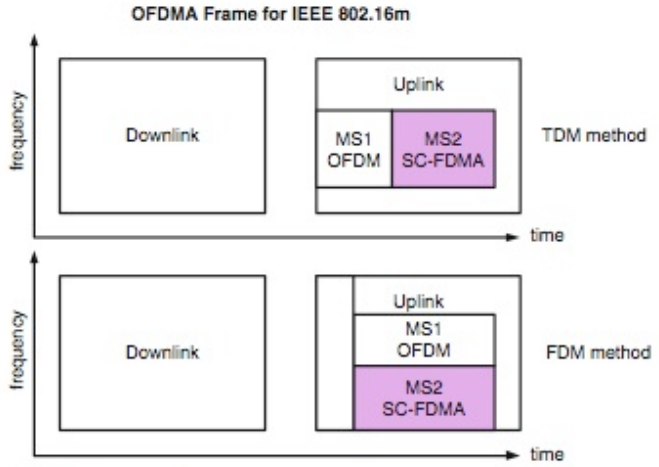


Fig. 13.17 SC-FDMA proposal

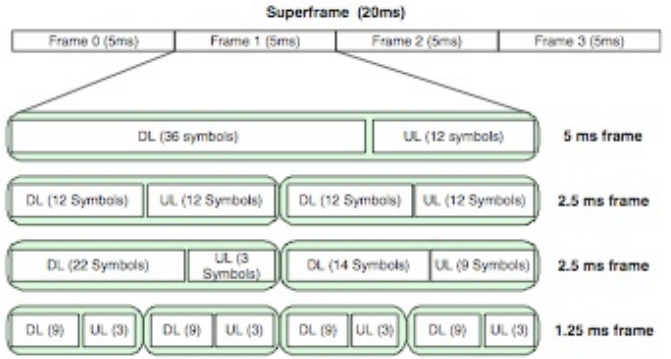
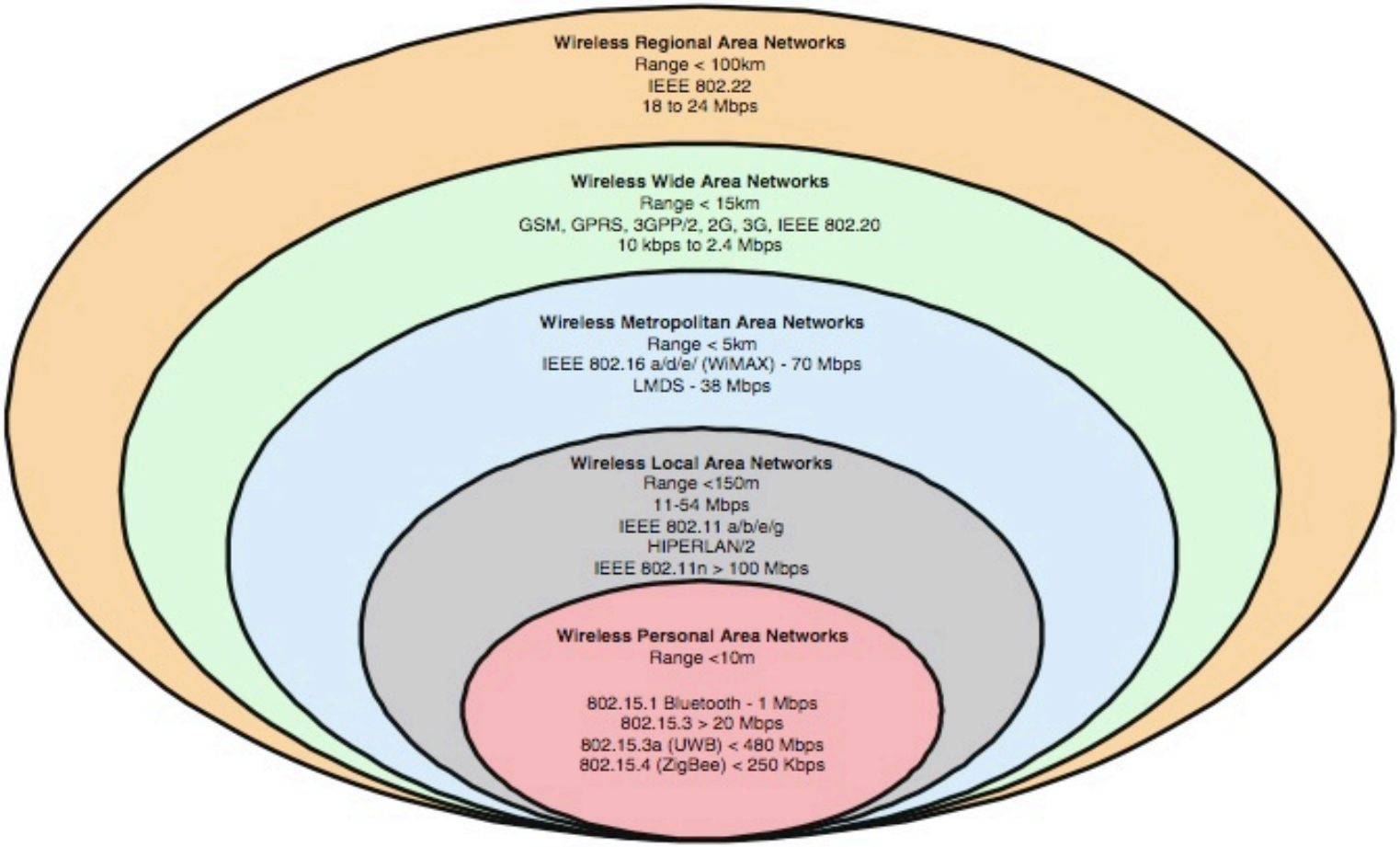


Fig. 13.18 Proposed IEEE 802.16m superframe structure

Frame structure for IEEE 802.16m

Fig. 13.19 Proposed IEEE 802.16m frame structure (© IEEE)

More Free Spectrum with IEEE 802.22



2 Comparison of standards

Operation of IEEE 802.22

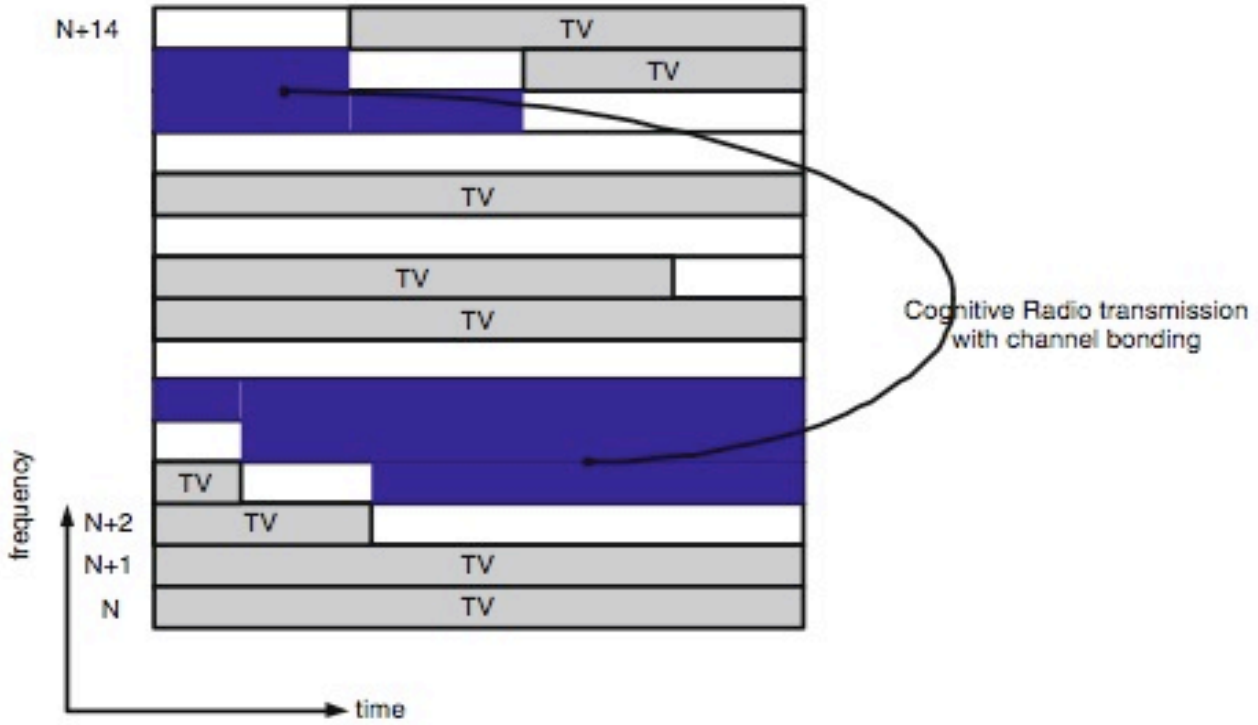


Fig. 13.23 Operation of IEEE 802.22: The WRAN device operation is restricted to have at least three contiguous vacant TV channels (6K FFT for 18 MHz) since US grade-A TV allocation requires at least two empty channels between TV channels

IEEE 802.22 Frame Structure

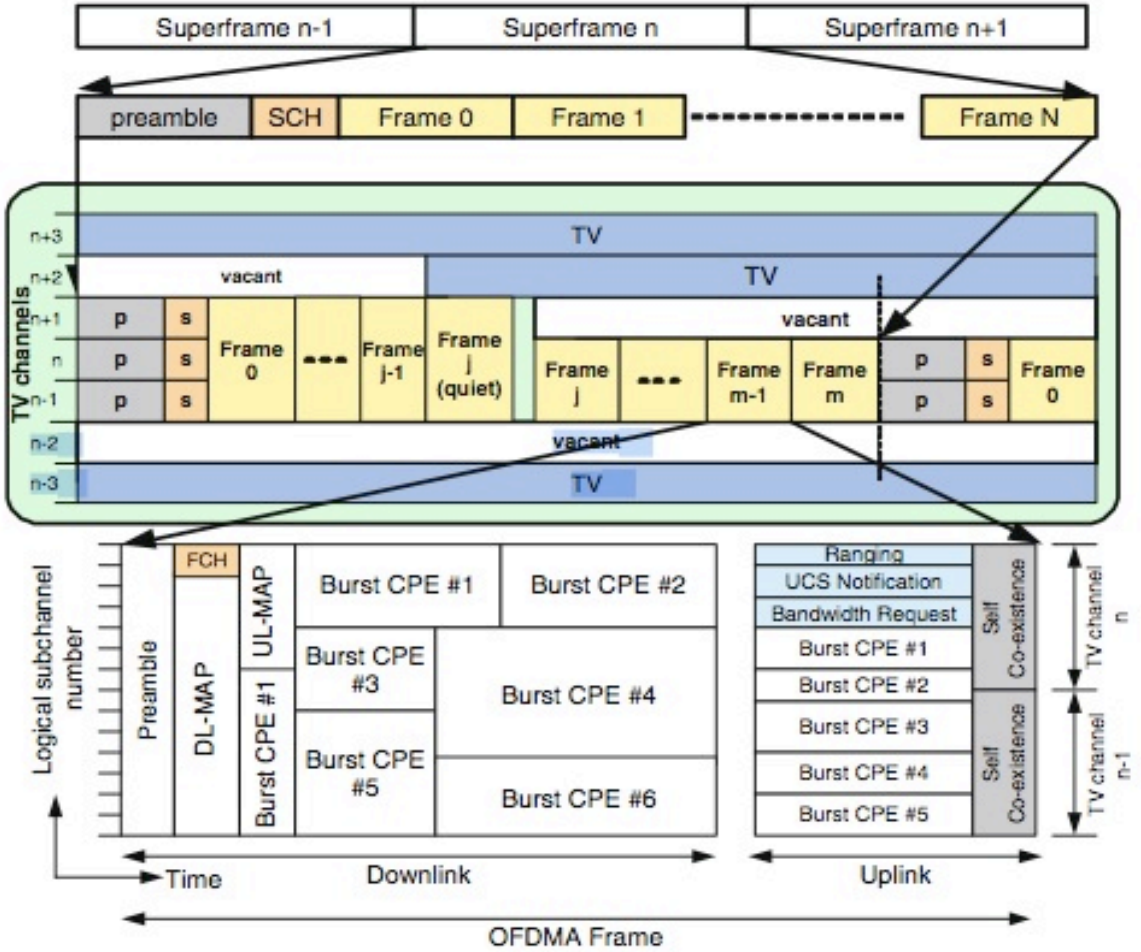


Fig. 13.24 IEEE 802.22 MAC superframe and frame structures

Sensing in IEEE 802.22

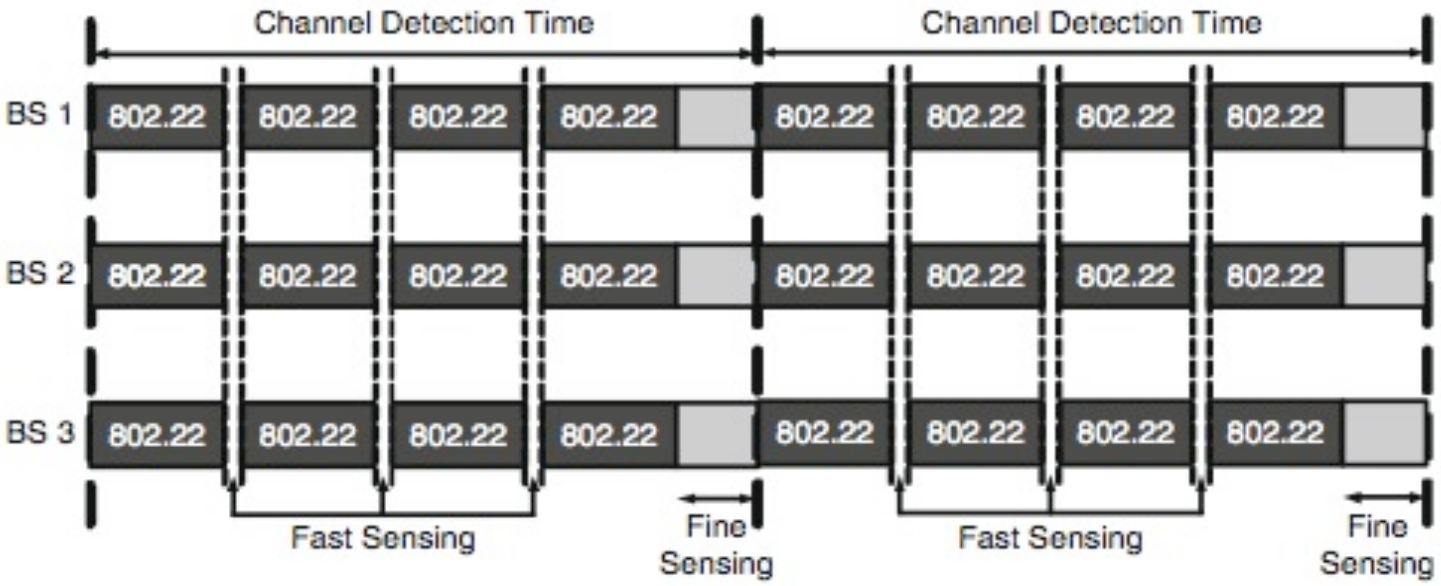


Fig. 13.25 Sensing in IEEE 802.22

References

- Mobile Broadband by M. Ergen