

Title: 802.16m basic frame structure for improved intra-system coexistence

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Mariana Goldhamer Voice:+972 3 645 6241

mariana.goldhamer@alvarion.com

ALVARION

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Purpose:

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Further information is located at <<http://standards.ieee.org/board/pat/pat-material.html>> and

<<http://standards.ieee.org/board/pat>>.

Relevant system requirements

- **6.4.2 Interference management**
 - IEEE 802.16m shall support interference mitigation schemes
- 7.1.1 Performance improvement

Table 6–Relative throughput of a data only system

Metric	DL data (xWirelessMAN-OFDMA Reference System)	UL data (xWirelessMAN-OFDMA Reference System)
Average user throughput	> 2x	>2x
Cell edge user throughput	> 2x	>2x

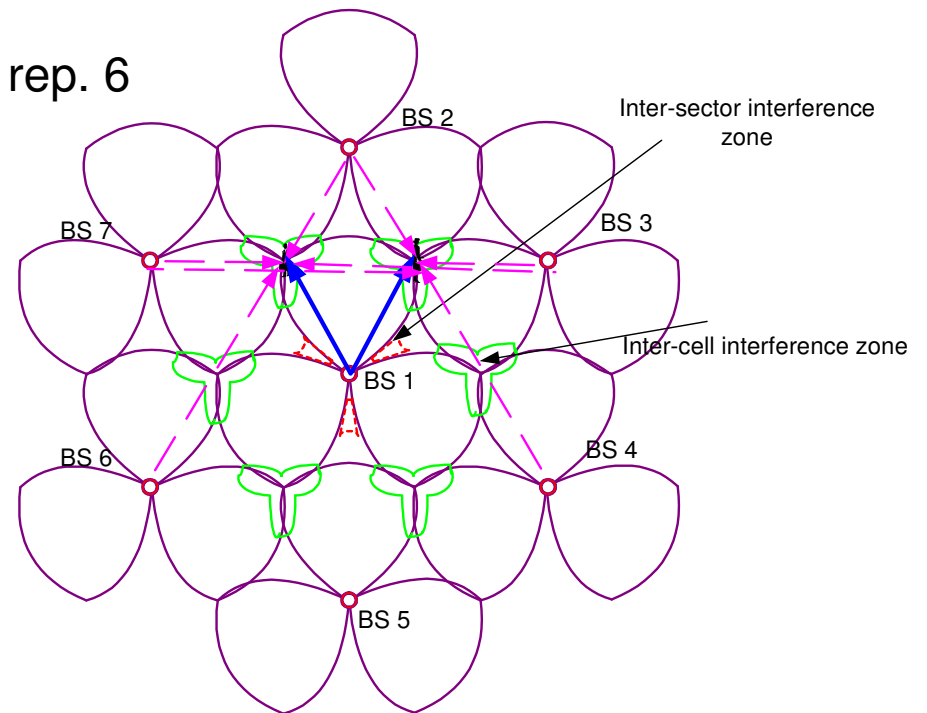
- **7.4 Cell coverage**
- **7.5 Enhanced multicast-broadcast service**
 - The performance requirements apply to a wide-area multi-cell multicast broadcast single frequency network (MBSFN)

Table 14–MBS minimum spectral efficiency vs. inter-site distance

Inter-site distance (km)	Min. spectral efficiency (bps/Hz)
0.5	4
1.5	2

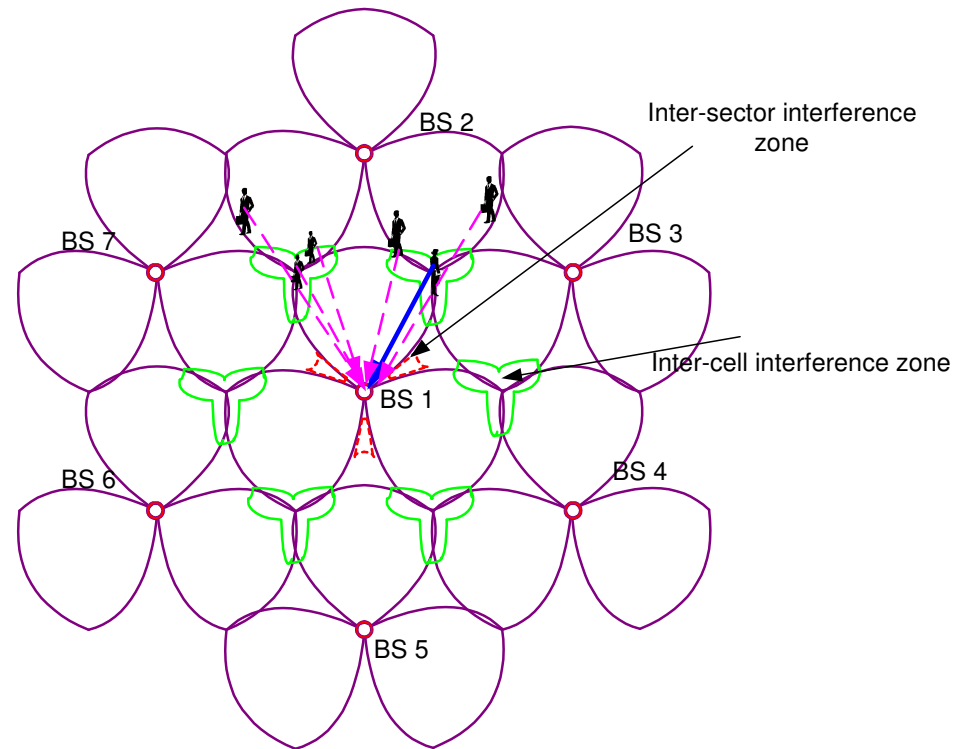
Inter cell/sector DL interference

- Problems in Reuse 1 scenario
 - inter-cell interference
 - inter-sector interference
 - SIR (Signal to Interference Ratio) of $-(5\dots6)$ dB per some sub-carriers
 - MAP transmission at QPSK1/2 rep. 6
 - High overhead



Inter cell/sector UL interference

- Similar problem as in DL

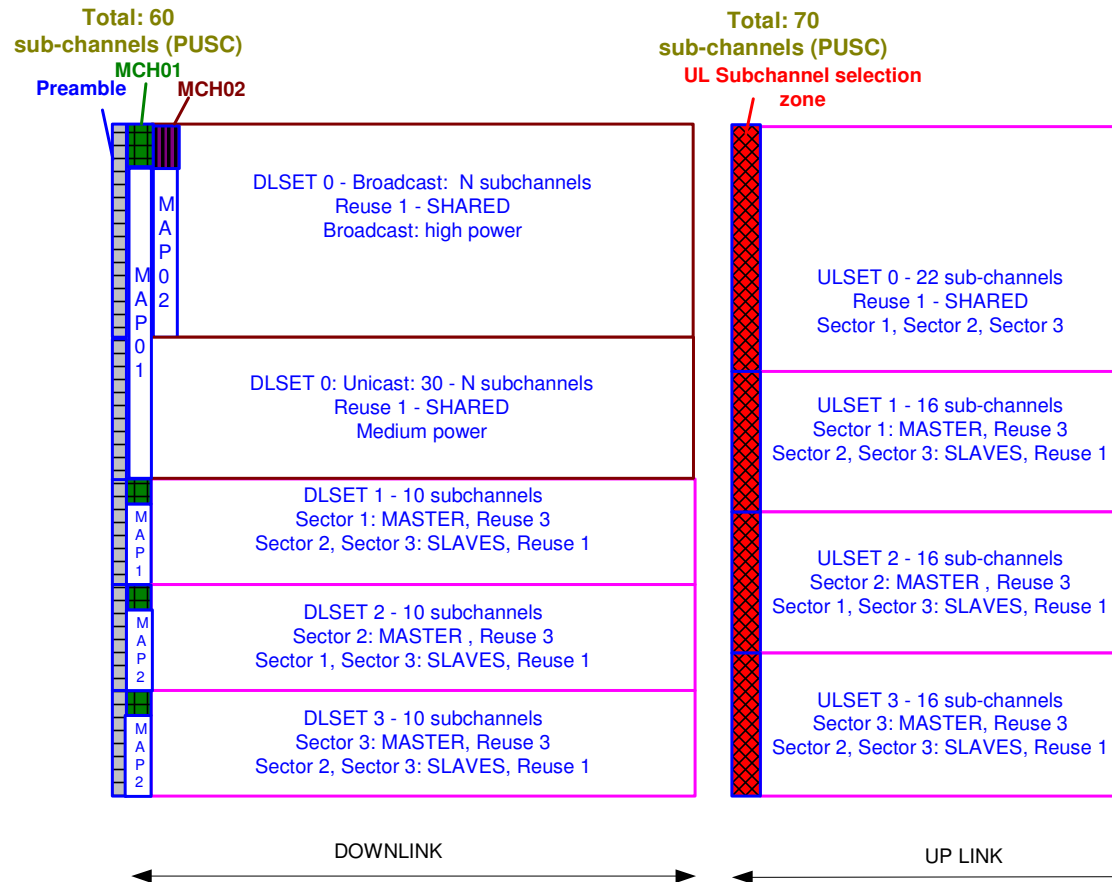


Elements of the solution

- Frame structure, including **both Reuse 1 and Reuse 3** approaches
 - Different sub-channel groups for Reuse 1 and Reuse 3 operation
 - **Reuse 3 operation is intended for the cell margin**
 - Sub-channel groups are named SETs
 - Each SET has its own MAP
 - Before each MAP is transmitted an MCH (MAP Control Header)
 - **Power rules per Sector for each SET**
- **Dedicated Reuse-1 zone** to form a single frequency network for broadcast traffic
- Coordinated UL sub-channel selection zone for proactive opportunistic scheduling and coordinated sounding

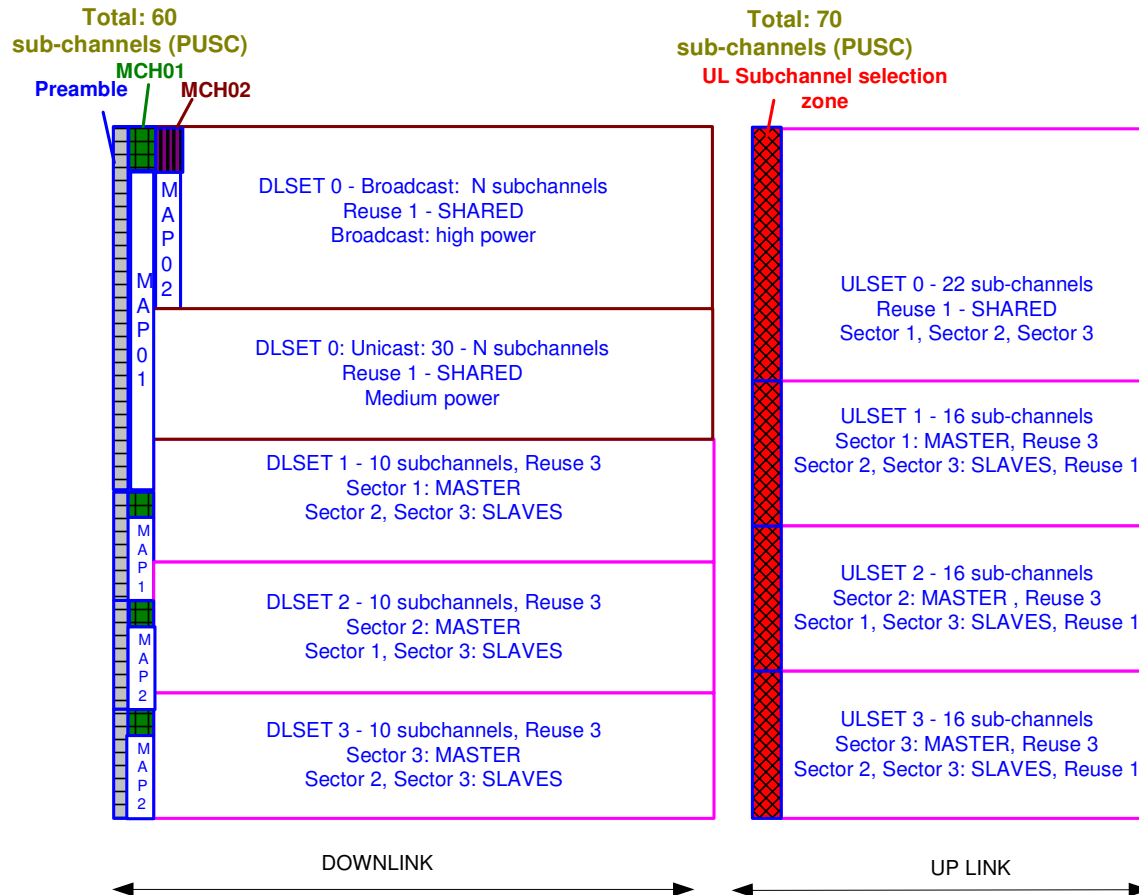
Frame partitions in OFDMA domain

- Parallel Reuse 1 and Reuse 3 operation
 - Frame split in SETs
 - Each SET has its own MAP, preceded by a MCH (MAP Control Header) and preambles
 - Broadcast area is part of the Reuse 1 SET
 - UL has a symbols dedicated for sounding or controls related to opportunistic scheduling



Flexible SET allocation

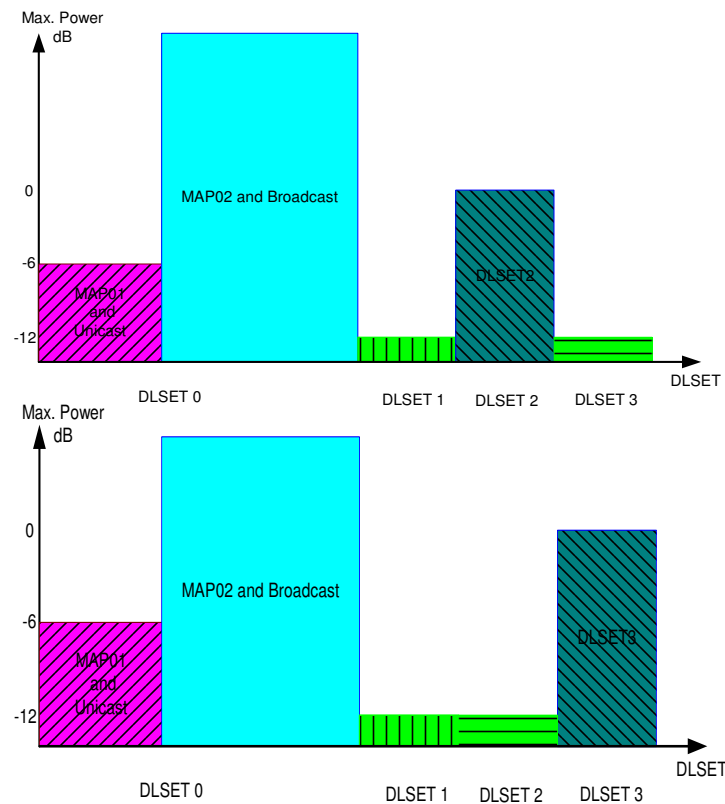
- MCH points to the actual SET partition
 - This allow full flexibility in sub-channel allocations to Reuse 1 and Reuse 3



Power rules

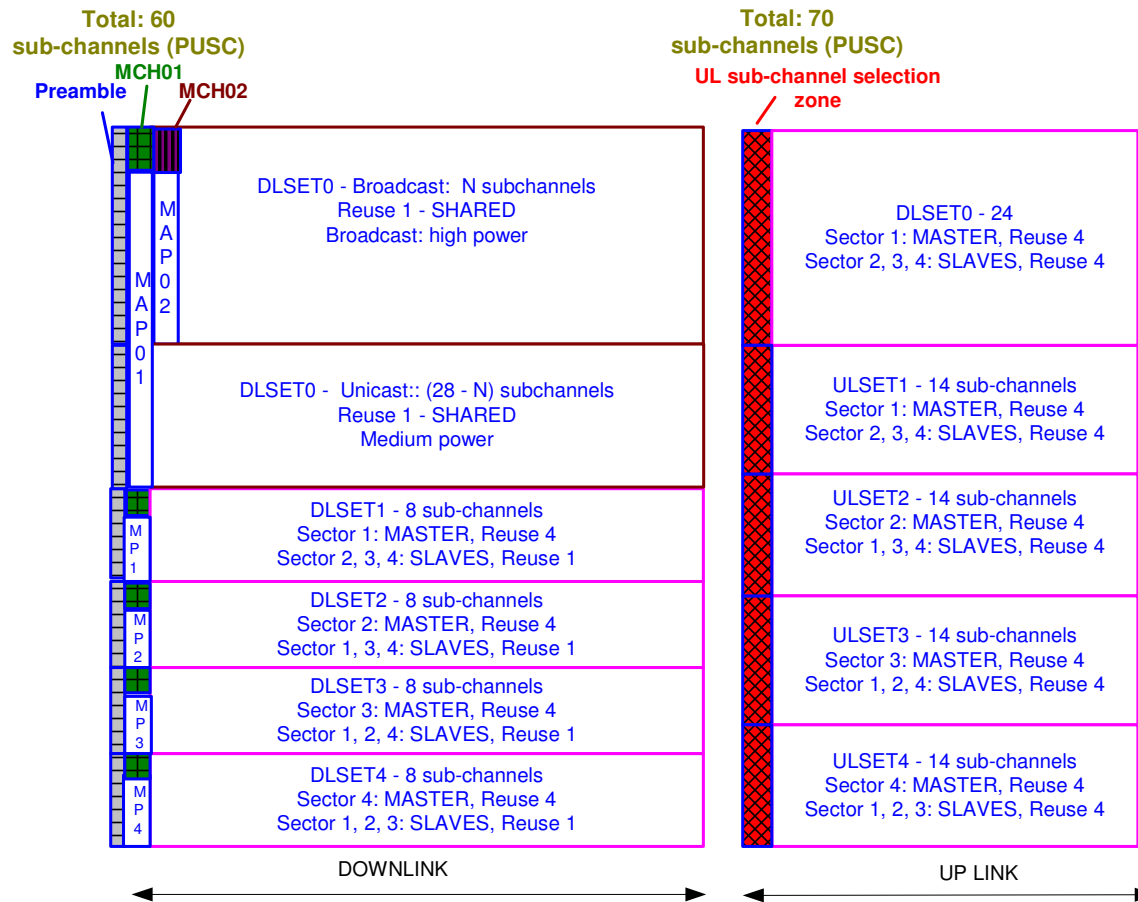
- **All the sub-channels may be used**

- SETS using the max. power density in Reuse 3 are called Master, those using the min. power are called SLAVES
- **Each BS sector has its own MASTER SET (high power)**
 - The inter-sector interference is reduced
 - Reuse 1 + Reuse 3 operation for a Sector will cover more than 2/3 of sub-channels used today with Fractional Frequency Reuse



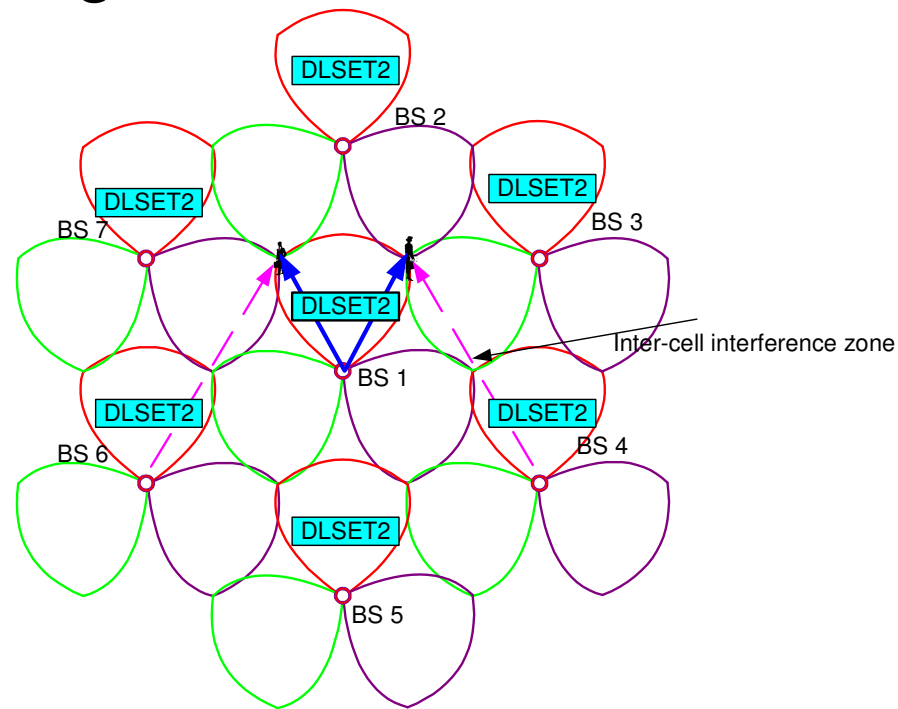
Four sector deployment

- The 4 sector deployment is attractive for broadband applications



Benefits

- Reuse 3 at cell margin dramatically reduces the inter-cell interference
 - Aprox. 10 dB gain



Legacy support

- Time division is the most suitable approach

Required actions

- **Required Actions**
- ***TOC***
 - **add a sub-clause to the Physical Layer Chapter, named “High-level frame structure”**
- ***Text in SDD***
 - Two possibilities:
 - **Ad-Hoc for the harmonization of this proposal with other proposals related to the frame structure**
 - in order to include in SDD a consolidated text.
 - If this contribution is accepted as it is, the Text for SDD is indicated in the basic contribution