

# Proposal for IEEE 802.16m SDD Text on PHY & MAC aspects of Location Services

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\*<http://standards.ieee.org/faqs/affiliationFAQ.html>>

Re: "PHY & MAC aspects of Location Services"; in response to the Call for Contributions and Comments on Project 802.16m System Description Document (SDD) 802.16m-08/033 for Session 57

Purpose: Adopt the proposal into the IEEE 802.16m System Description Document

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# Scope

- This contribution presents SDD text for the PHY & MAC aspects of Location Services (Section 14)
- A new pilot structure called “extended reference signal (ERS)” is proposed to enhance the location based services and femto cell synchronization

# Extended Reference signal (ERS)

- ERS is a new pilot structure for 802.16m in which the detectability is greatly enhanced
- ERS improves the LBS services
  - Improves the availability of the other BS's ERS for the trilaterization or triangulation methods
  - Also improves the accuracy of the single BS ID based methods
  - Improves the accuracy of the location calculation
- ERS improves the femto cell synchronization
  - Robust for the femto cells located indoor
  - Improves the accuracy of the femto cell positioning

# Extended reference signal (ERS)

- Features of the ERS
  - Transmitted from one antenna only
  - Dedicated subframes only contains the ERS pilot sequence
  - Power boosting is possible
  - Frequency Reuse factor  $>1$  and there will be coordination between BSs to avoid ERS collision
  - Low duty cycle transmission thus low overhead
  - Configurable length in time domain, thus incremental detection possible

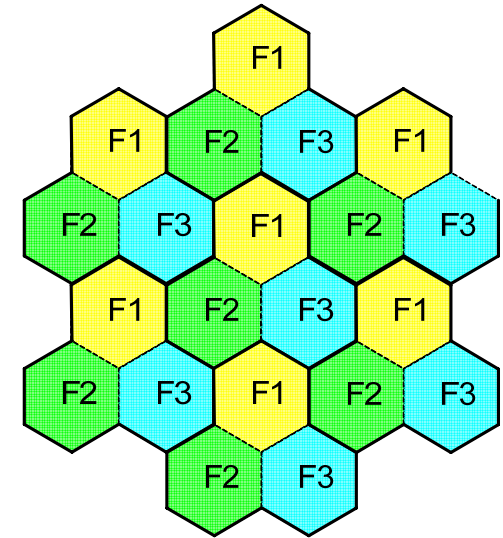
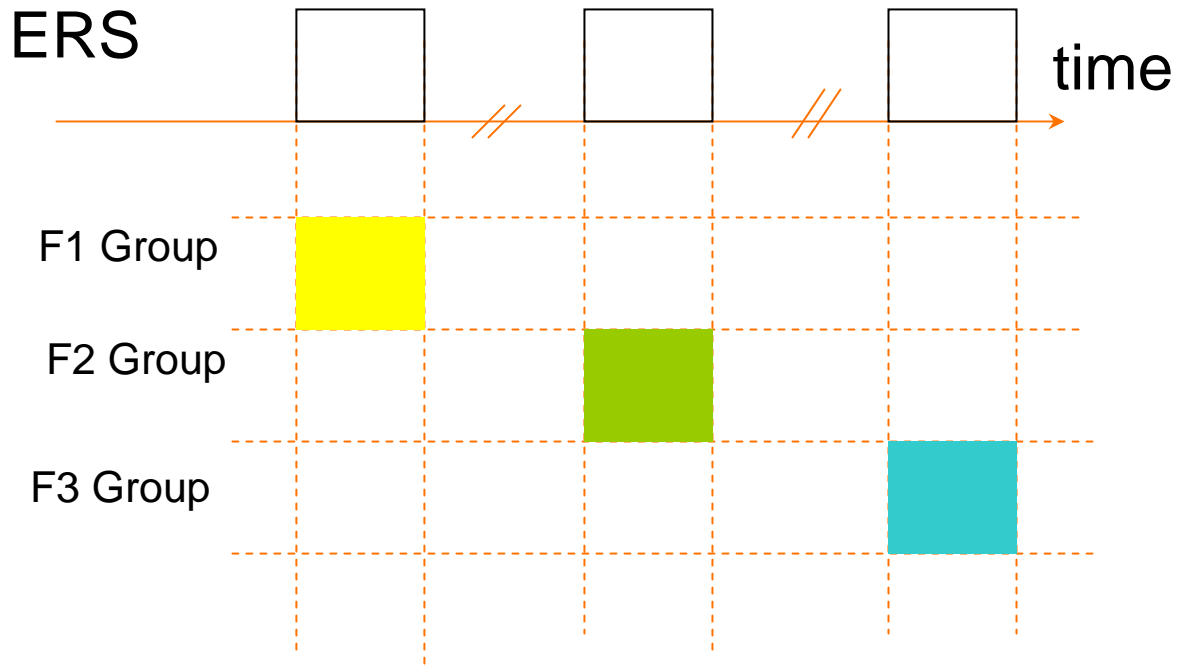
# Example ERS subframe



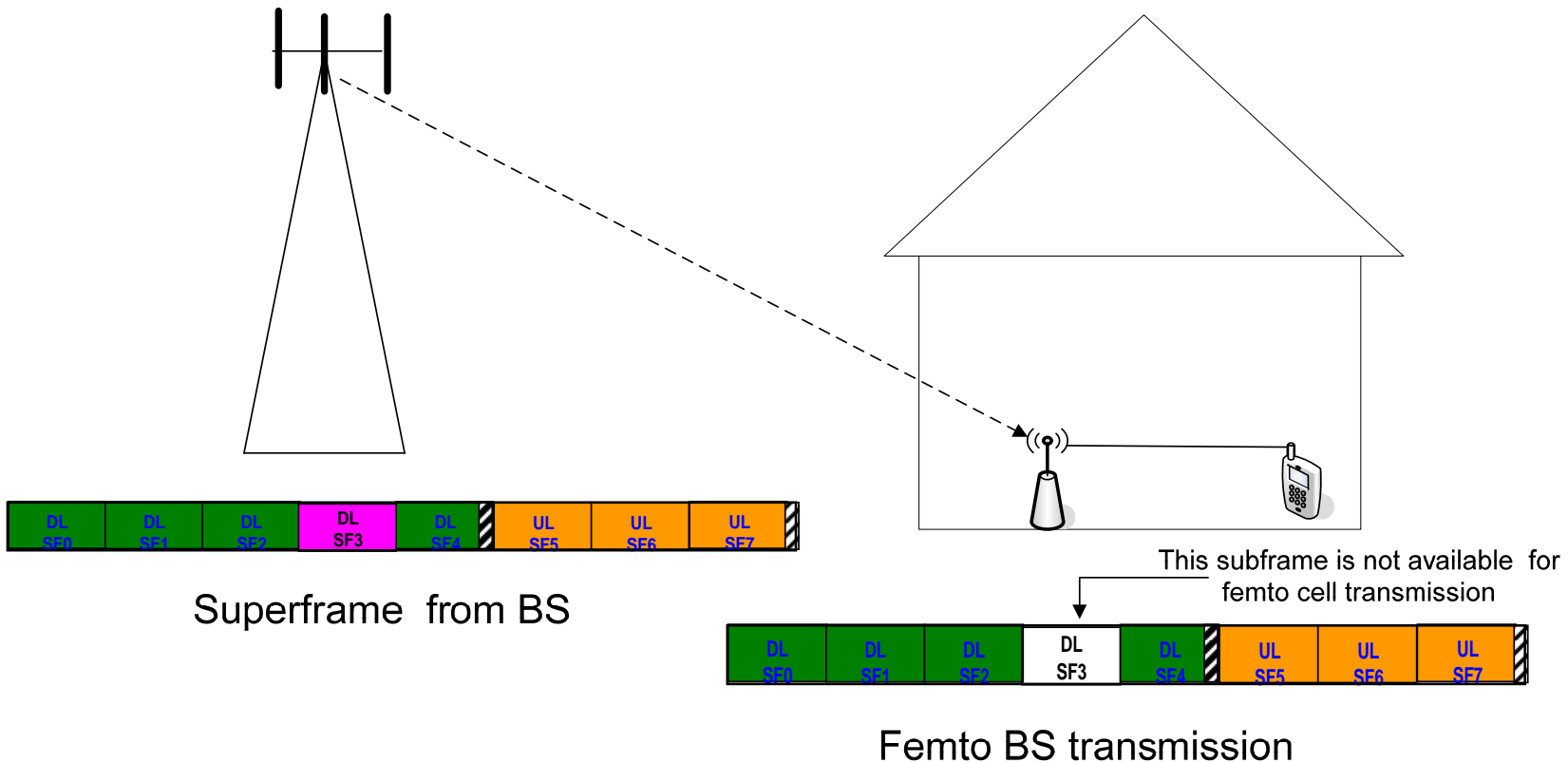
**ERS subframe**

- Configurable length, position and periodicity
- Details of the pilot sequence are FFS

# Frequency reuse = 3



# Femto-cell Operation



- When the ERS is transmitted by the BS in a particular subframe, that subframe won't be available for the femto BS to MS transmission
- Femto BS informs that to the serving mobiles in its BCH channel

# Proposed SDD text

- Include the following text in the for Section 14 ,  
**Support for Location Based Services**

## “14.1 Extended reference signal (ERS)

A pilot structure is introduced to greatly enhance the detectability of the pilots to improve the accuracy of location based services and improve the timing synchronization of the indoor femto cell applications. ERS contains only the pilots in few dedicated downlink subframes.

### Features of the ERS

- Dedicated subframes only contains the ERS pilot sequence
- Power boosting is possible
- Frequency Reuse factor  $>1$  and there will be coordination between BSs to avoid ERS collision
- Low duty cycle transmission thus low overhead
- Configurable length in time domain, thus incremental detection possible

The details of the pilot sequence are FFS .”