FWA Frequency allocation and co-existence in the 24.5-26.5GHz band
The CEPT SE19 on going discussion

Cover Sheet for Presentation to IEEE 802.16 Broadband Wireless Access Working Group (Rev. 1)
Document Number: IEEE 802.16.2p-00/06
Date Submitted: 2000-03-01
Source:

Andrea Nascimbene
Ericsson Telecomunicazioni
Via Cadorna, 73
20090 Vimodrone- Milan - Italy

Voice: 011-39-02-26598646
Fax: 011-39-02-26598583
E-mail: Andrea.Nascimbene@tei.ericsson.se

Venue:

Albuquerque, IEEE 802.16.2 Session #6

Purpose:

Describe the CEPT SE19 status and activity on the FWA systems co-existence. The activity is similar to that within 802.16.2. Further co-operation between the parties involved may be usefully investigated and encouraged.

Notice:

Release:

IEEE Patent Policy:

FWA Frequency allocation and co-existence in the 24.5-26.5GHz band

The CEPT SE19 on going discussion

IEEE802.16 - Albuquerque - March 2000

- The co-existence issue
  - Co-ordinated and uncoordinated deployment
  - Guard band evaluation
  - Spectrum allocation example
  - Co-operation examples
  - Standardisation activity status

Andrea.Nascimbene@tei.ericsson.se

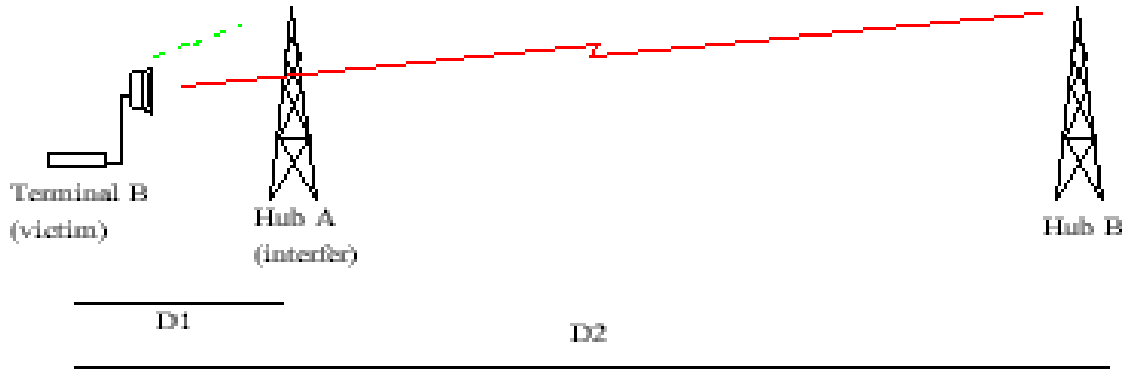
BWA spectrum efficiency- the co-existence issue

- Systems with different capacity and access techniques, share the 26GHz spectrum (CEPT T/R 13-02). Interference scenarios are:
  - adjacent frequency block in the same area or,
  - in the same frequency block in adjacent areas
- Co-operation between the different Operators, i.e. site sharing or co-ordinated cell planning, would allow a more efficient spectrum usage.
  - **co-ordination is possible when operators are a few**
- Operators could prefer to have the autonomy and flexibility of choosing both the system behaviour and the provided coverage
  - **for uncoordinated deployment the n° of guard bands is by default proportional to the n° of operators**

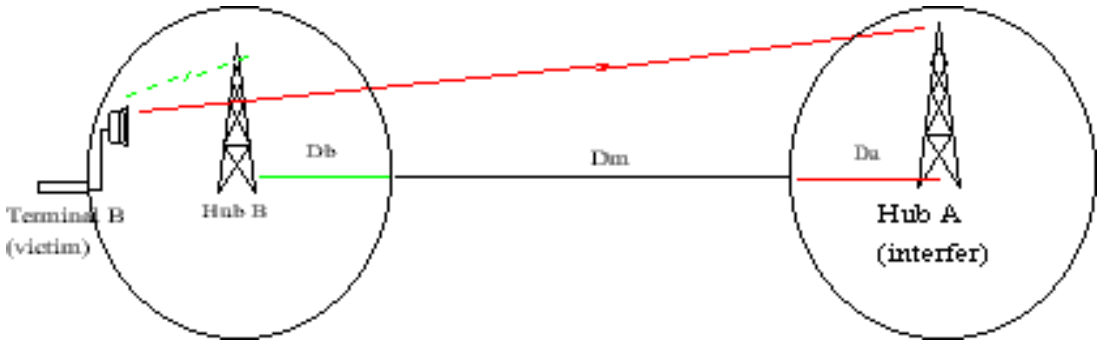
Andrea.Nascimbene@tei.ericsson.se

Uncoordinated deployment interference scenarios

adjacent frequency block - same area :



same frequency block - adjacent areas:

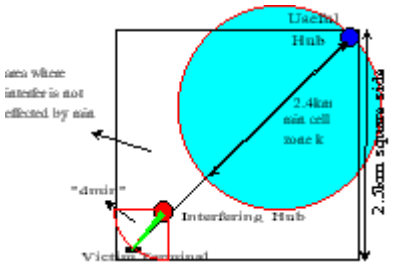


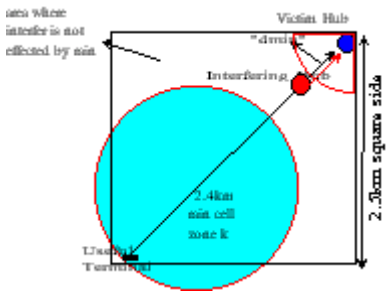
Andrea.Nascimbene@tei.ericsson.se

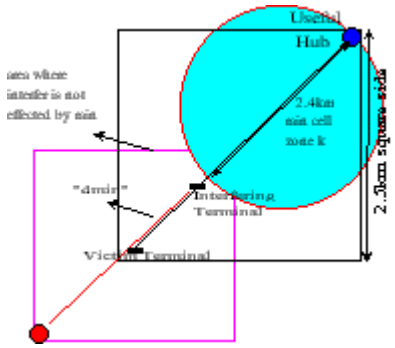
Uncoordinated deployment:

the ISOP (Interference Scenario Occurrence Probability) model

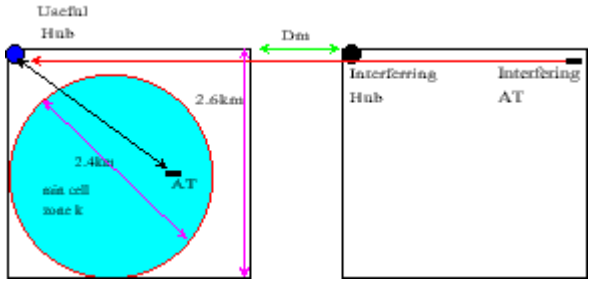
adjacent frequency block - same area :







same frequency block - adjacent areas:



Andrea.Nascimbene@tei.ericsson.se

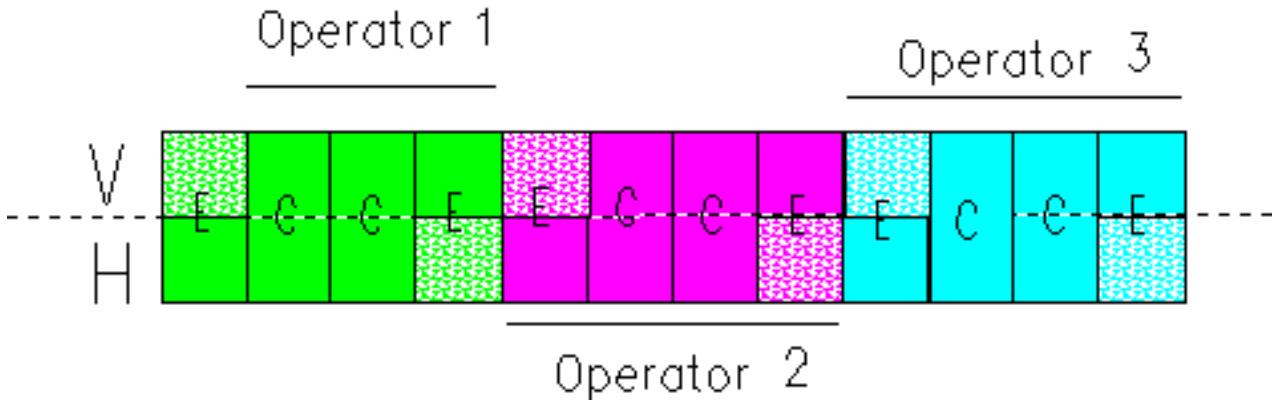
The co-existence issue (1) - guard band/distance requirements

Operators deployment scenario	Planning criteria	Guard band/distance requirements		notes
		FDD	TDD***	
Same area – adjacent frequency band ****	Hub to Terminal 1% "ISOP*"	1x28MHz	1x28MHz	XPD usage can allow more flexible guard band providing
	Terminal to Terminal 1% "ISOP*"		1x28MHz	
	Hub to Hub		2x28MHz	As alternative TDD can perform 1x28 Mhz gurd + a coordination hub-hub distance >500mt
	Operators co-operation	None or reduced to a minimum according to a case by case evaluation		The site or near site sharing mitigation is applicable to FDD only **
Same frequency band – adjacent area ****	Hub to terminal 1% ISOP	>20km	>20km	
	Terminal to Terminal		>20km	
	Hub to Hub		>40km	

* ISOP: Interference Scenario Occurrence Probability
** the site/near site sharing mitigation supposes the up/down band direction statement
*** it refers to both TDD or mixed TDD/FDD system deployments
**** a full interference LOS is assumed for distances up to 40km

Andrea.Nascimbene@tei.ericsson.se

The co-existence issue (2) - spectrum allocation example-1

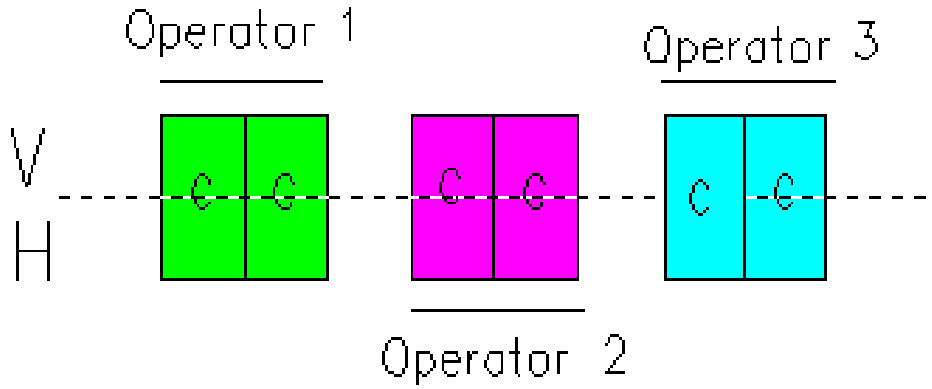


Operators need a minimum duplex band of 4x28MHz

- in order to have 2 ch interference free and start deployment
- no channel guards are wasted
- operators are pushed finding a degree of co-ordination needed in order to utilise the “edge” channels
- operators have the flexibility to choose the best solution with no constrains

Andrea.Nascimbene@tei.ericsson.se

The co-existence issue (3) - spectrum allocation example-2

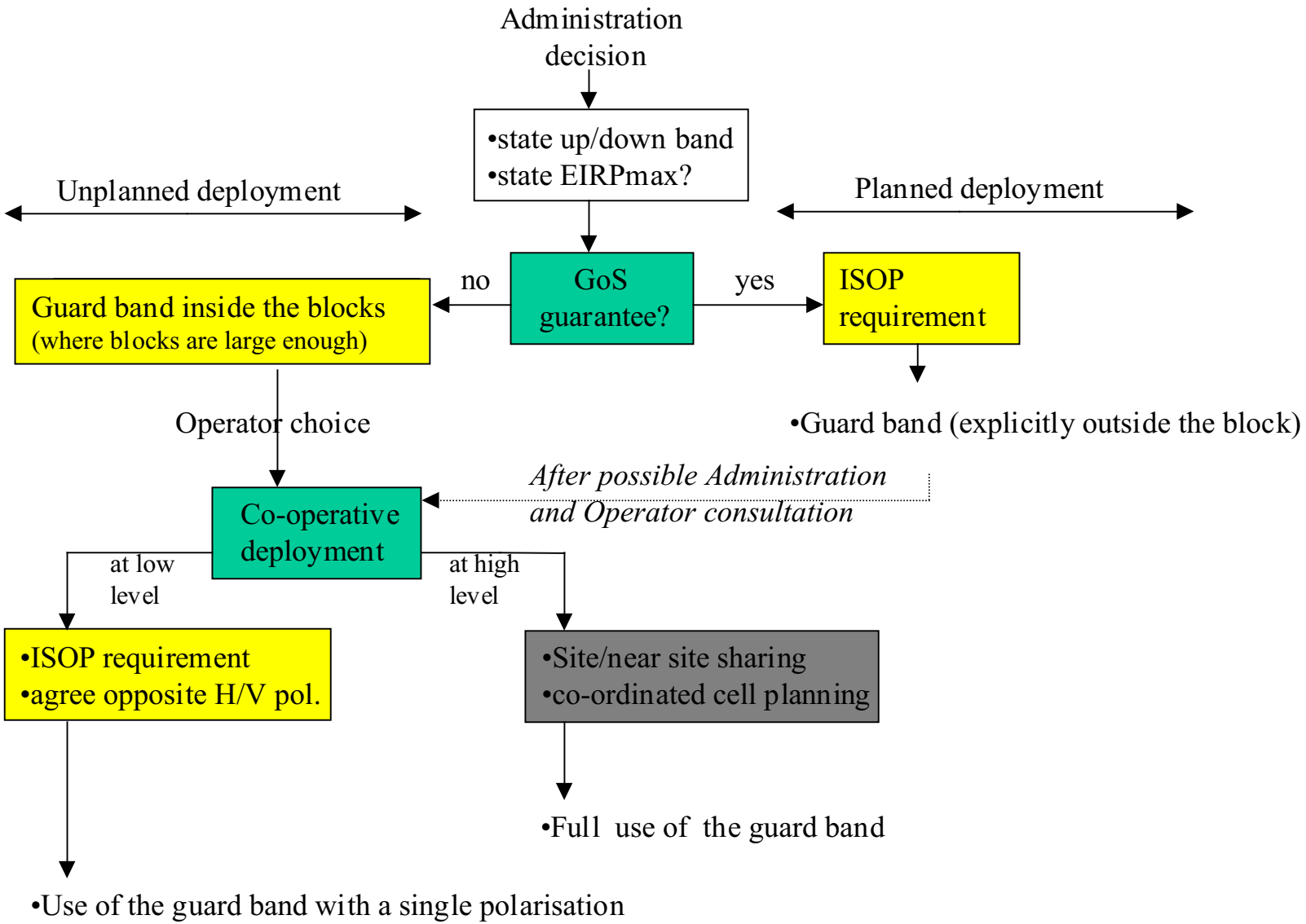


Operators have a minimum duplex band of 2x28MHz

- in order to have 2 ch interference free
- expansion is more difficult

Andrea.Nascimbene@tei.ericsson.se

The co-existence issue (4) - Deployment scenarios flow chart



Andrea.Nascimbene@tei.ericsson.se

Co-operation example:
site/near site sharing" deployment

- **assuming: up/downlink bands defined, same EIRPs and ATPC:**

		Guard Band requirement (MHz)
Victim	**Interfer**	
4Mb/s	**4Mb/s**	0
	8Mb/s	0
	16Mb/s	0
	34Mb/s	1.75
8Mb/s	**4Mb/s**	0
	8Mb/s	0
	16Mb/s	0
	34Mb/s	0
16Mb/s	**4Mb/s**	0.8
	8Mb/s	0.8
	16Mb/s	0
	34Mb/s	0.9
34Mb/s	**4Mb/s**	2.5
	8Mb/s	1.75
	16Mb/s	0.6
	34Mb/s	0

Negligible guard band requirement for FDD systems

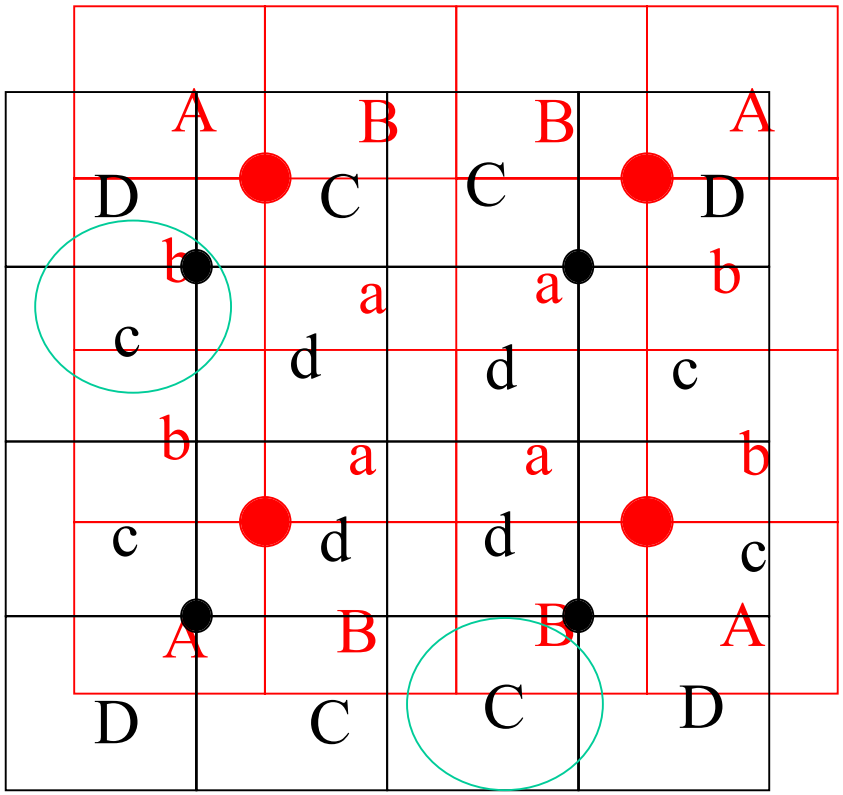
Operators should agree site/near site sharing, or ...

Andrea.Nascimbene@tei.ericsson.se

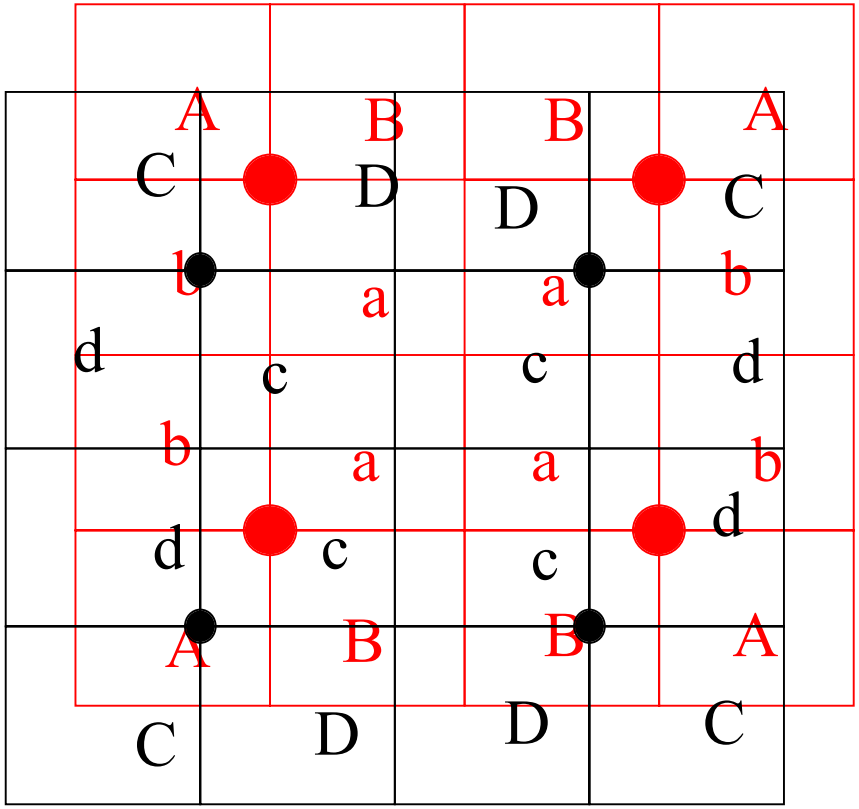
Co-operation example:

co-ordinated cell planning

guard band need



no guard band need



Operators should divide the town in sector and agree the frequency/polarization use

Andrea.Nascimbene@tei.ericsson.se

Uncoordinated deployment - interference effects

- Assuming an operator with 3.5MHz system - 3.5MHz guard band and a neighbouring operator with 14MHz system - no guard

Interfer distance	14MHz system		3,5MHz system	
	clear sky	rain	clear sky	rain
50mt	7,7	-12,3	-14,3	-34,3
700mt	30,6	10,6	8,6	-11,4
C/I figures at the victim receiver				

The 3.5MHz system can't operate
The 14Mhz system suffer lighter problems

Andrea.Nascimbene@tei.ericsson.se

CEPT SE19 deliverable

- ***ERC Tech Report* and *ERC Recommendation* for the FWA use in the 26GHz band**
  - **services: up to several Mb/s per user with circuit or packet oriented traffic**
  - **minimum 1 or** 2x28**Mhz assigned per operator,** according to system capacity and operational requirement
  - FDD guard band 1x28MHz **(outside or inside the blocks with blocks consequently larger); guard distance 20km**
  - TDD guard band 2x28MHz **(outside or inside the blocks with blocks consequently larger); guard distance 40km**
  - co-operative deployment **encouraged for further use of guard/edge bands**
  - up/down link statement
    - ***the ERC Rec. is approved by SE WG and now on public enquiry phase***
    - ***the ERC Report is to be approved by SE WG by 2Q00***

Andrea.Nascimbene@tei.ericsson.se