CEPT ECC
Electronic Communications Committee
Project Team SE19

67th Meeting, 23-24 Avril 2014

Maisons-Alfort

Date issued: 14/03/2014

Source: FRANCE

Subject: SE19 WI 34: Proposal to meet the WI34 goals.

Group membership required to read? (Y/N): N

Summary: The WI34 aims at introducing narrow channels into the 6 GHz range. This contribution proposes channel arrangements from the related ECC report and presents the advantages to go for a new recommendation instead of the revision of the ERC/REC14-01and ERC/REC 14-02.

Proposal: SE19 is invited to consider :

- a proposal of narrow channels arrangements in the 6 GHz band,
- the interests to produce a new specific recommendation to present ways of introducing those channels,
- a proposal of new recommendation.

Background:

At its 66th meeting, WGSE has considered the ECC Report related to introduction of narrow channels in frequency band between 3 and 15 GHz (WI28) mature enough to be submited to public consultation. Furthermore, WGSE agreed on the proposal to create a new work item (WI 34) to reflect the conclusions of this draft report in a new recommendation or revising the relevant recommandations to include narrow channels in the 6 GHz band.

1. INTRODUCTION

At its 66th meeting, WGSE has considered the draft ECC Report assessing the technical feasibility of introducing narrow channel spacing in some existing plans, center gap and/or guard bands of FWS channel arrangement between 3 and 15 GHz (WI28). This was then submitted to public consultation. Furthermore, WGSE agreed on the proposal to create a new work item (WI 34) to reflect the conclusions of this draft report in a new recommendation or providing new versions of the relevant recommendations to include narrow channels in the 6 GHz band.

The subject of the work item has been defined as follows:

> "*Revision of ERC/REC14-01and ERC/REC 14-02 or produce a new specific recommendation to include narrow channels (2 MHz, 1 MHz, 0,5 MHz, 0,25 MHz, 0.025 MHz) in the L6 (5925-6425 MHz) and U6 (6425 – 7125 MHz) bands in the guard band and center gap*."

Hence, SE19 is invited to consider:

- A proposal of narrow channel arrangements into the 6 GHz range,
- The rational of choosing the option of a new specific recommendation introducing those channels,
- A proposal of new recommendation.

2. CHANNEL ARRANGEMENTS

Possible ways to implement narrow channels into the 6 GHz range (lower and upper part of the band) are shown in the annex 1.

The table below presents the number of channel which may be implemented simultaneously, thus providing administrations, relevant flexibility to cope with coordination issues.

Canalisations (MHz)	Lower part of the 6 GHz band	Upper part of the 6 GHz band	
		Option 1 : 30 MHz plan	Option 2: 40 MHz plan
3.5	3	/	4
2	5	/	7
1	10	5	14
0.5	21	10	28
0.25	42	20	56
0.025	420	200	560

Table 1: Number of narrow channels which may be simultaneously implemented using the plans of the annex 1

The 2x10.5 MHz arrangement[1] from the plan 1 of the option 1 and 2 proposed in annex 1 overlaps the two 6 GHz plan (5925-6425 MHz and 6425-7125 MHz) which makes impossible to introduce narrow channels in the guard band and duplex gap of the existing 6 GHz channel arrangement by revising the two corresponding recommendations (14-01 and 14-02).

Then, it is more consistent to elaborate a new specific recommendation on narrow channels.

[1] 6169.745-6180.245 MHz and 6424.553-6435.053 MHz

3. PROPOSAL OF NEW RECOMMENDATION

SE19 is invited to consider the draft new recommendation proposed by France presented in the Annex 2.

Annex 1

Option 1: U6 GHz band with 40 MHz channel

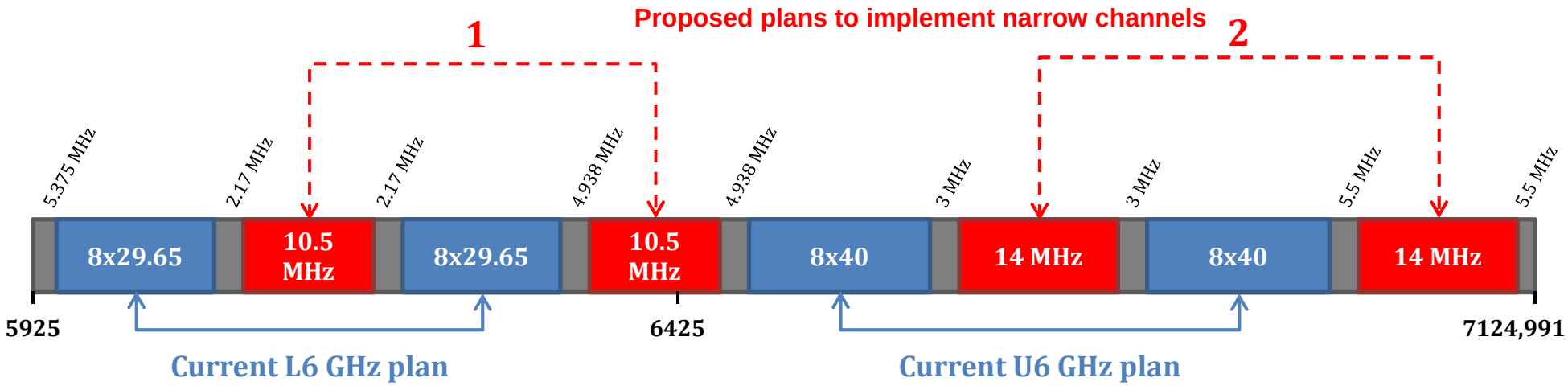

Figure 1: Implementation of narrow channels in the upper (40 MHz channels) and lower part of the 6 GHz band

Option 2: U6 GHz band with 30 MHz channel

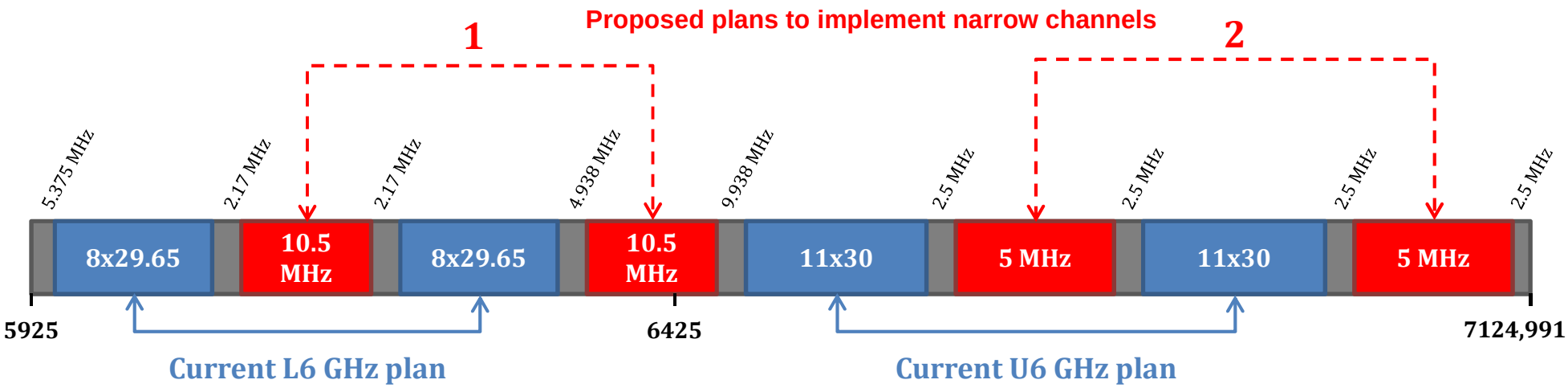

Figure 2: Implementation of narrow channels in the upper (30 MHz channels) and lower part of the 6 GHz band

Annex 2

The French contribution proposes a draft new recommendation which develops channel arrangement into the 6 GHz range.

Draft ECC new Recommendation (YY)XX

Implementation of narrow channels (0.025 to [2/3.5] MHz) in the 6 GHz band

Approved DD Month YYYY (Arial 9pt bold)

[last updated: DD Month YYYY) (Arial 9pt) [date of the latest update]]

Edition

INTRODUCTION (STYLE: HEADING 1)

[TBC]

ECC RECOMMENDATION OF YY(XX) ON IMPLEMENTATION OF NARROW CHANNELS IN THE 6 GHZ BAND (0.025 TO [2/3.5] MHZ)

"The European Conference of Postal and Telecommunications Administrations,

considering

a) that CEPT/ERC/Recommendation 14-01 E defines channels arrangements for high capacity analogue and digital radio-relay systems operating in the band 5925 MHz – 6425 MHz,

b) that CEPT/ERC/Recommendation 14-02 E defines channels arrangements for high, medium and low capacity digital fixed service systems operating in the band 6425-7125 MHz,

c) that the whole band from 5925 MHz to 7125 MHz is allocated to the fixed service on a primary basis,

d) that the ECC report 215 indicates a need for radio links supporting long range and low capacity systems,

e) that frequency band below 6 GHz are less available for fixed links due to increasing demand for IMT,

f) there are technical and economic advantages in adopting harmonized channel plans which favors industrial development

g) that ECC Report 215 assesses the technical feasibility of introducing very narrow channel spacing (25 kHz to 2 MHz) in some existing plans, in guard bands and center gaps of FWS channel arrangement at 6 and 10 GHz,

h) that ECC Report 215 demonstrates that the 6 GHz band is suitable for introducing narrow channels without causing harmful interferences to other services with appropriate power limitation ensuring compatibility between fixed links and satellite services,

recommends

1. that administrations wishing to implement narrow channels in the lower part of the 6 GHz band, should refer to the channel arrangement described in annex 1,

2. that administrations wishing to implement narrow channels in the upper part of the 6 GHz band, should refer to the channel arrangement described in annex 2,

Note:

Please check the Office documentation database http://www.ecodocdb.dk for the up to date position on the implementation of this and other ECC Recommendations.

ANNEX 1: IMPLEMENTATION OF NARROW CHANNELS IN THE LOWER PART OF THE 6 GHZ BAND.

A1.1 DERIVATION OF RADIO FREQUENCY CHANNELS

The radio frequency channel arrangement for carrier spacings of 3.5 MHz, 2 MHz, 1 MHz, 0.5 MHz, 0.25 MHz and 0.025 MHz shall be derived as follows:

Let

f_0 be the frequency (MHz) of the center of the band of frequencies occupied, f_0 = 6302.4 MHz,

fn be the center frequency (MHz) of one radio-frequency channel in the lower half of the band,

fn' be the center frequency (MHz) of one radio-frequency channel in the upper half of the band,

then the frequencies (MHz) of individual channels are expressed by the following relationships:

a) for systems with a carrier spacing of 3.5 MHz:

lower half of the band: $fn = f_0 - 134.405 + 3.5\ n$

upper half of the band: $fn' = f_0 + 120.403 + 3.5\ n$ where n = 1, 2, 3.

b) for systems with a carrier spacing of 2 MHz:

lower half of the band: $fn = f_0 - 133.155 + 2\ n$

upper half of the band: $fn' = f_0 + 121.153 + 2\ n$ where n = 1, 2, 3, 4, 5.

c) for systems with a carrier spacing of 1 MHz:

lower half of the band: $fn = f_0 - 132.655 + n$

upper half of the band: $fn' = f_0 + 121.653 + n$ where n = 1, 2…..9, 10.

d) for systems with a carrier spacing of 0.5 MHz:

lower half of the band: $fn = f_0 - 132.905 + 0.5\ n$

upper half of the band: $fn' = f_0 + 121.903 + 0.5\ n$ where n = 1, 2…..20, 21.

e) for systems with a carrier spacing of 0.25 MHz:

lower half of the band: $fn = f_0 - 132.78 + 0.25\ n$

upper half of the band: $fn' = f_0 + 122.028 + 0.25\ n$ where n = 1, 2…..41, 42.

e) for systems with a carrier spacing of 0.025 MHz:

lower half of the band: fn = f_0 – 132.6675 + 0.025 n

upper half of the band: fn' = f_0 +122.1405 + 0.025 n where n = 1, 2…..419, 420.

A1.2 CALCULATED PARAMETERS ACCORDING TO RECOMMENDATION ITU-R F.746.

Table 1: Calculated parameters according to ITU-R F.746

XS (MHz)	n	f_1 (MHz)	f_n (MHz)	f_1' (MHz)	f_n' (MHz)	Z1S (MHz)	Z2S (MHz)	YS (MHz)	DS (MHz)
3.5	1…3	6171.495	6178.495	6426.303	6433.303	3.92	6.697	247.808	254.808
2	1……5	6171.245	6179.245	6425.553	6433.553	3.67	6.447	246.308	254.308
1	1…..10	6170.745	6179.745	6425.053	6434.053	3.17	5.947	245.308	254.308
0.5	1……21	6169.995	6179.995	6424.803	6434.803	2.42	5.197	244.808	254.808
0.25	1……42	6169.87	6180.12	6424.678	6434.928	2.295	5.072	244.558	254.808
0.025	1….420	6169.7575	6180.2325	6424.5655	6435.0405	2.1825	4.9595	244.333	254.808

Editor's note: Are Z1S and Z2S relevant because we have introduced new "sub band" ? Is 5925 MHz or 6167.575 the lower band edge?

XS Separation between centre frequencies of adjacent channels

YS Separation between centre frequencies of the closest go and return channels

Z1S Separation between the lower band edge and the centre frequency of the first channel

Z2S Separation between centre frequencies of the final channel and the upper band edge

DS Duplex spacing (f_n' - f_n)

A1.3 OCCUPIED SPECTRUM

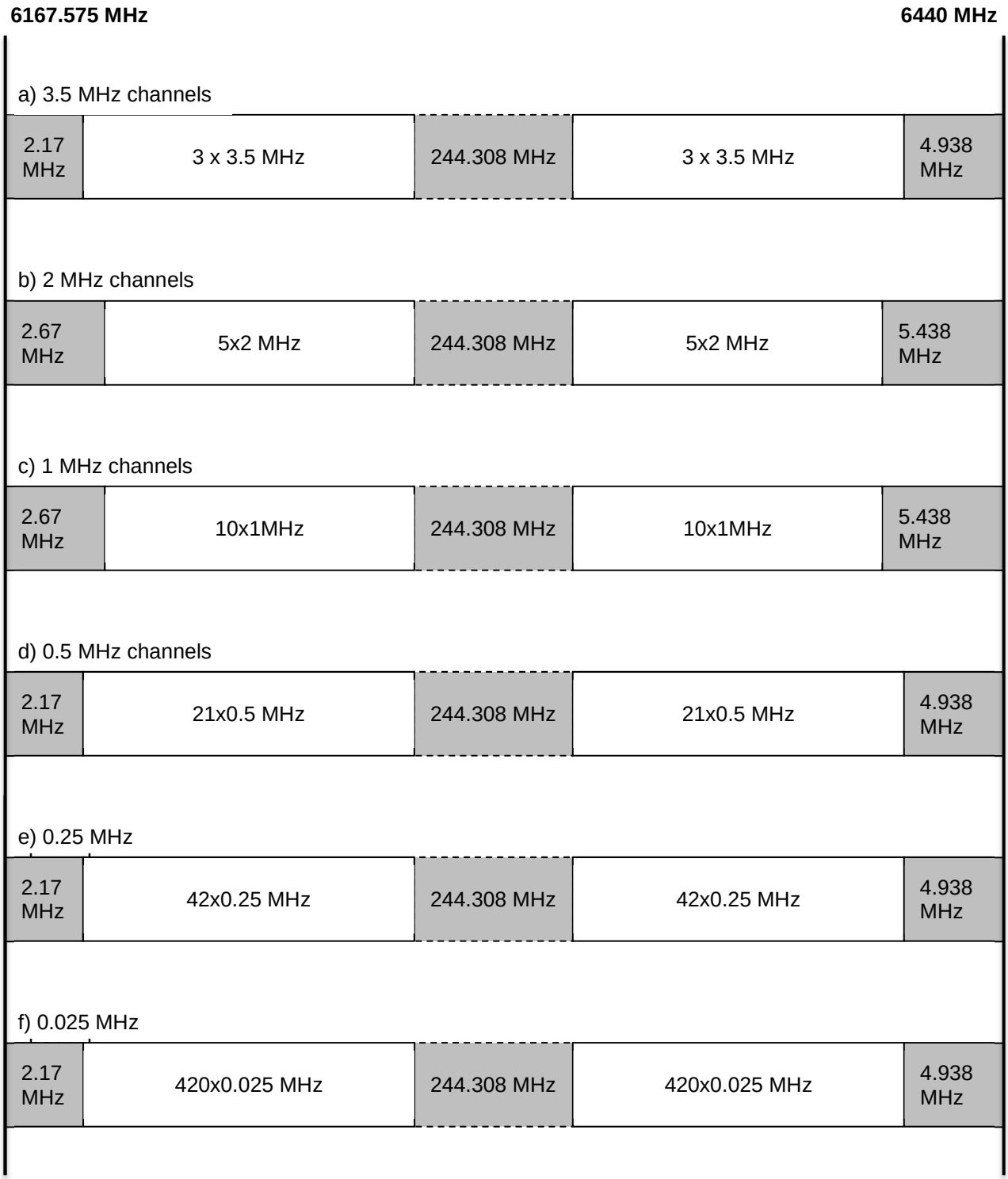

Figure 1: Illustration of the occupied spectrum

ANNEX 2: IMPLEMENTATION OF NARROW CHANNELS IN THE UPPER PART OF THE 6 GHZ BAND.

A2.1 IMPLEMENTATION OF NARROW CHANNELS – OPTION 1 (40 MHZ CHANNELS)

A2.1.1 Derivation of radio frequency channel

The radio frequency channel arrangement for carrier spacings of 3.5 MHz, 2 MHz, 1 MHz, 0.5 MHz, 0.25 MHz and 0.025 MHz shall be derived as follows:

Let

f_0 be the frequency (MHz) of the center of the band of frequencies occupied, f_0 = 6 941.25 MHz,

fn be the center frequency (MHz) of one radio-frequency channel in the lower half of the band,

fn' be the center frequency (MHz) of one radio-frequency channel in the upper half of the band,

then the frequencies (MHz) of individual channels are expressed by the following relationships:

a) for systems with a carrier spacing of 3.5 MHz:

lower half of the band: $fn = f_0 - 180 + 3.5\ n$

upper half of the band: $fn' = f_0 + 162.5 + 3.5\ n$ where n = 1, 2, 3, 4.

b) for systems with a carrier spacing of 2 MHz:

lower half of the band: $fn = f_0 - 179.25 + 2\ n$

upper half of the band: $fn' = f_0 + 163.25 + 2\ n$ where n = 1, 2, 3, 4, 5, 6, 7.

c) for systems with a carrier spacing of 1 MHz:

lower half of the band: $fn = f_0 - 178.75 + n$

upper half of the band: $fn' = f_0 + 163.75 + n$ where n = 1, 2…..13, 14.

d) for systems with a carrier spacing of 0.5 MHz:

lower half of the band: $fn = f_0 - 178.5 + 0.5\ n$

upper half of the band: $fn' = f_0 + 164 + 0.5\ n$ where n = 1, 2…..27, 28.

e) for systems with a carrier spacing of 0.25 MHz:

lower half of the band: $fn = f_0 - 178.375 + 0.25\ n$

upper half of the band: $fn' = f_0 + 164.125 + 0.25\ n$ where n = 1, 2…..55, 56.

e) for systems with a carrier spacing of 0.025 MHz:

lower half of the band: fn = f_0 – 178.2625 + 0.025 n

upper half of the band: fn' = f_0 + 164.2375 + 0.025 n where n = 1, 2…..559, 560.

A2.1.2 Calculated parameters according to recommendation ITU-R F.746

Table 2: Calculated parameters according to recommendation ITU-R F.746

XS (MHz)	n	f_1 (MHz)	f_n (MHz)	f_1' (MHz)	f_n' (MHz)	Z1S (MHz)	Z2S (MHz)	YS (MHz)	DS (MHz)
3.5	1…4	6764.75	6775.25	7107.25	7117.75	4.75	7.25	332	342.5
2	1……7	6764	6776	7106.5	7118.5	4	6.5	330.5	342.5
1	1…..14	6763.5	6776.5	7106	7119	3.5	6	329.5	342.5
0.5	1……28	6763.25	6776.75	7105.75	7119.25	3.25	5.75	329	342.5
0.25	1……56	6763.125	6776.875	7105.625	7119.375	3.125	5.625	328.75	342.5
0.025	1….560	6763.0125	6776.9875	7105.5125	7119.4875	3.0125	5.5125	328.525	342.5

Editor's note: Are Z1S and Z2S relevant because we have introduced new "sub band" ? Is 6425 MHz or 6760 the lower band edge?

XS Separation between centre frequencies of adjacent channels

YS Separation between centre frequencies of the closest go and return channels

Z1S Separation between the lower band edge and the centre frequency of the first channel

Z2S Separation between centre frequencies of the final channel and the upper band edge

DS Duplex spacing (f_n' - f_n)

A2.1.3 OCCUPIED SPECTRUM

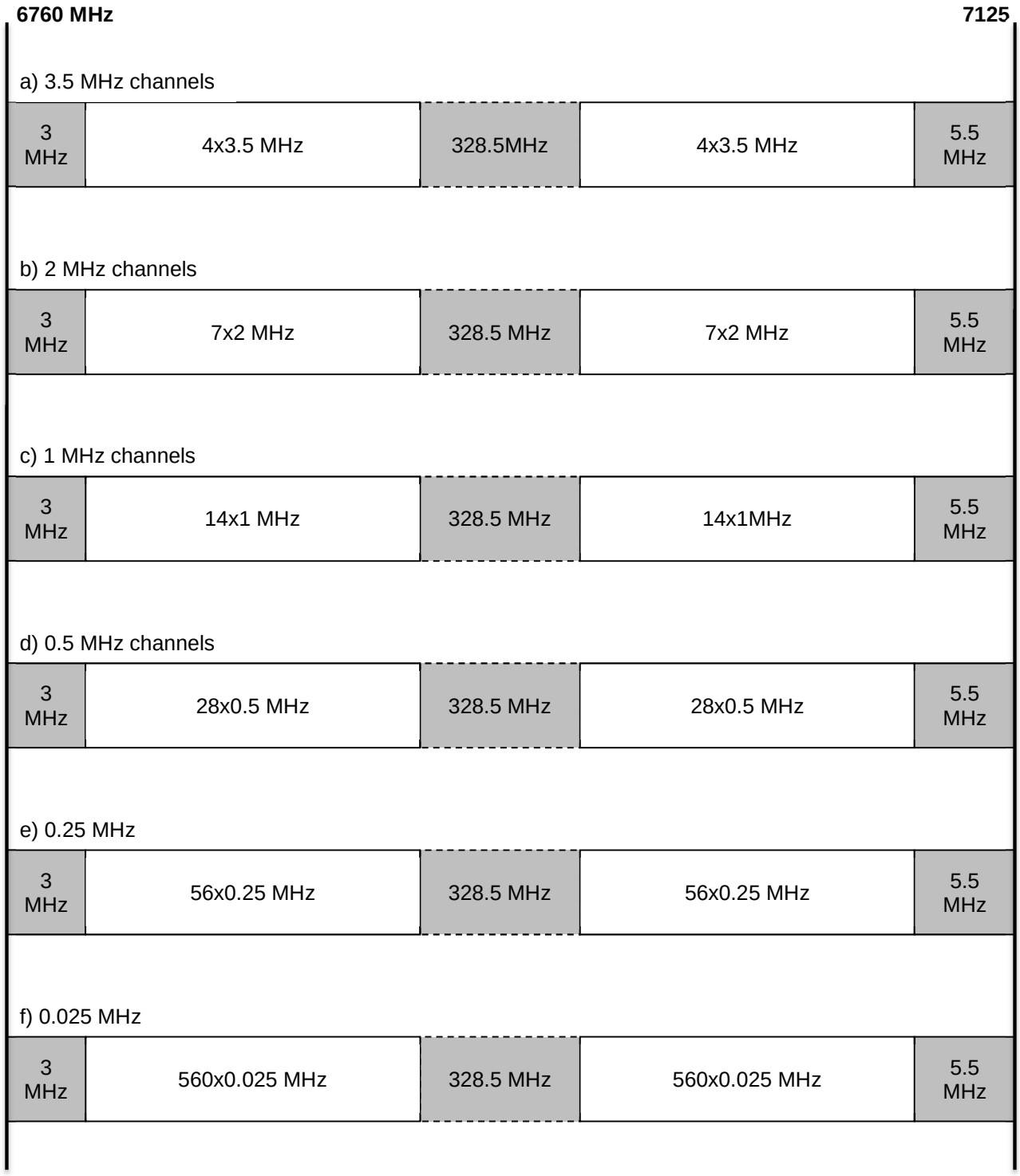

Figure 2: Occupied spectrum

A2.2 IMPLEMENTATION OF NARROW CHANNELS AND 30 MHZ CHANNELS

A2.1.4 Derivation of radio frequency channel

The radio frequency channel arrangement for carrier spacings of 1 MHz, 0.5 MHz, 0.25 MHz and 0.025 MHz shall be derived as follows:

Let

f_0 be the frequency (MHz) of the center of the band of frequencies occupied, f_0 = 6 950 MHz,

fn be the center frequency (MHz) of one radio-frequency channel in the lower half of the band,

fn' be the center frequency (MHz) of one radio-frequency channel in the upper half of the band,

then the frequencies (MHz) of individual channels are expressed by the following relationships:

a) for systems with a carrier spacing of 1 MHz:

lower half of the band: $fn = f_0 - 173 + n$

upper half of the band: $fn' = f_0 + 167 + n$ where n = 1, 2, 3, 4, 5.

b) for systems with a carrier spacing of 0.5 MHz:

lower half of the band: $fn = f_0 - 172.75 + 0.5\ n$

upper half of the band: $fn' = f_0 + 167.25 + 0.5\ n$ where n = 1, 2…..9, 10.

c) for systems with a carrier spacing of 0.25 MHz:

lower half of the band: $fn = f_0 - 172.625 + 0.25\ n$

upper half of the band: $fn' = f_0 + 167.375 + 0.25\ n$ where n = 1, 2…..19, 20.

d) for systems with a carrier spacing of 0.025 MHz:

lower half of the band: $fn = f_0 - 172.5125 + 0.025\ n$

upper half of the band: $fn' = f_0 + 167.4875 + 0.025\ n$ where n = 1, 2…..199, 200.

A2.1.5 Calculated parameters according to recommendation ITU-R F.746

XS (MHz)	n	f_1 (MHz)	f_n (MHz)	f_1' (MHz)	f_n' (MHz)	Z1S (MHz)	Z2S (MHz)	YS (MHz)	DS (MHz)
1	1…5	6778	6782	7118	7122	3	3	336	340
0.5	1…10	6777.75	6782.25	7117.75	7122.25	2.75	2.75	335.5	340
0.25	1…20	6777.625	6782.375	7117.625	7122.375	2.625	2.625	335.25	340
0.025	1...200	6777.5125	6782.4875	7117.5125	7122.4875	2.5125	2.5125	335.025	340

Table 3: Calculated parameters according to recommendation ITU-R F.746

Editor's note : Are Z1S and Z2S relevant because we have introduced new "sub band" ? Is 6425 MHz or 6760 the lower band edge ?

XS Separation between centre frequencies of adjacent channels

YS Separation between centre frequencies of the closest go and return channels

Z1S Separation between the lower band edge and the centre frequency of the first channel

Z2S Separation between centre frequencies of the final channel and the upper band edge

DS Duplex spacing (f_n' - f_n)

A2.1.6 OCCUPIED SPECTRUM

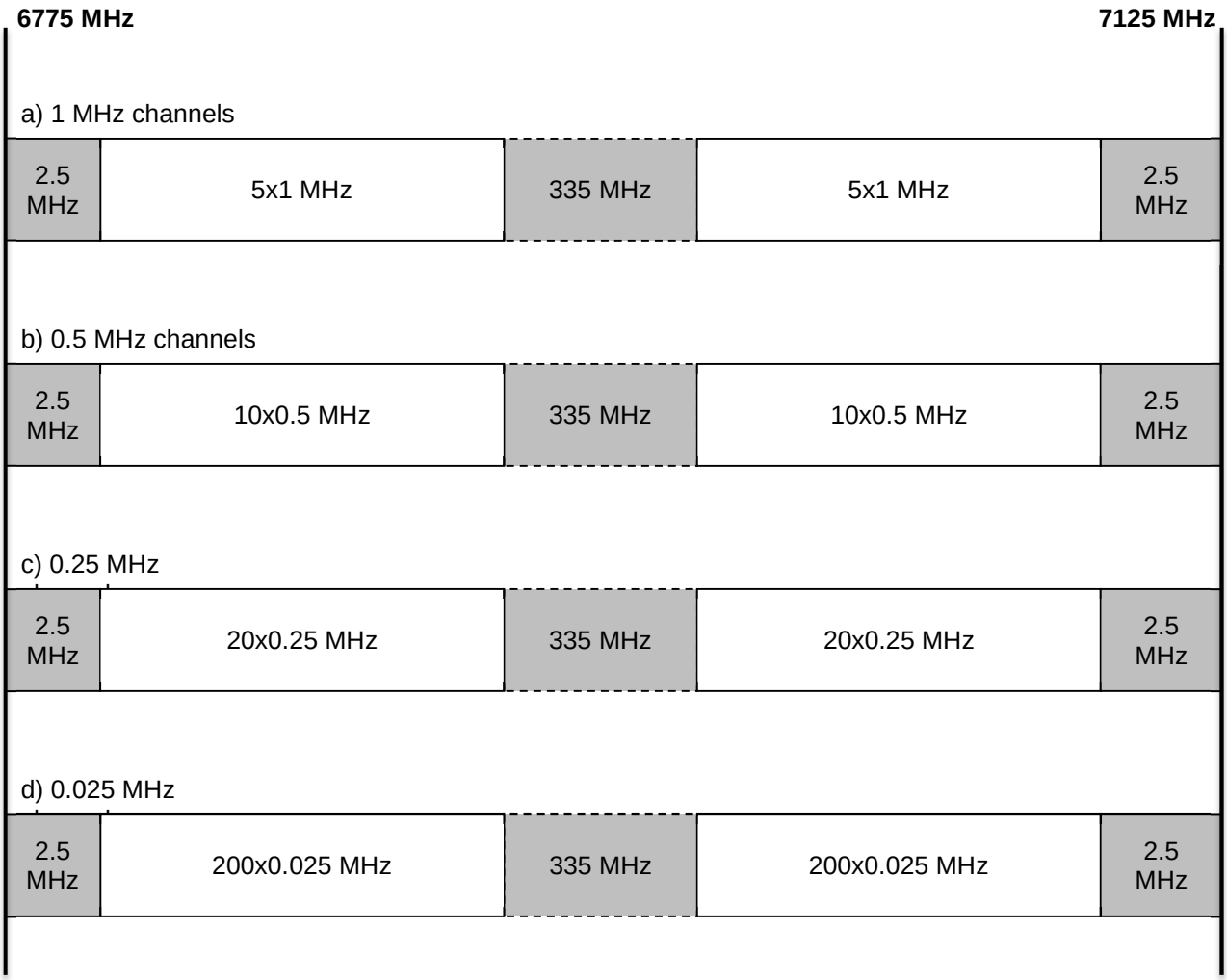

Figure 3: Occupied spectrum

ANNEX 3: OVERVIEW OF THE IMPLEMENTATION OF NARROW CHANNELS IN THE 6 GHZ BAND.

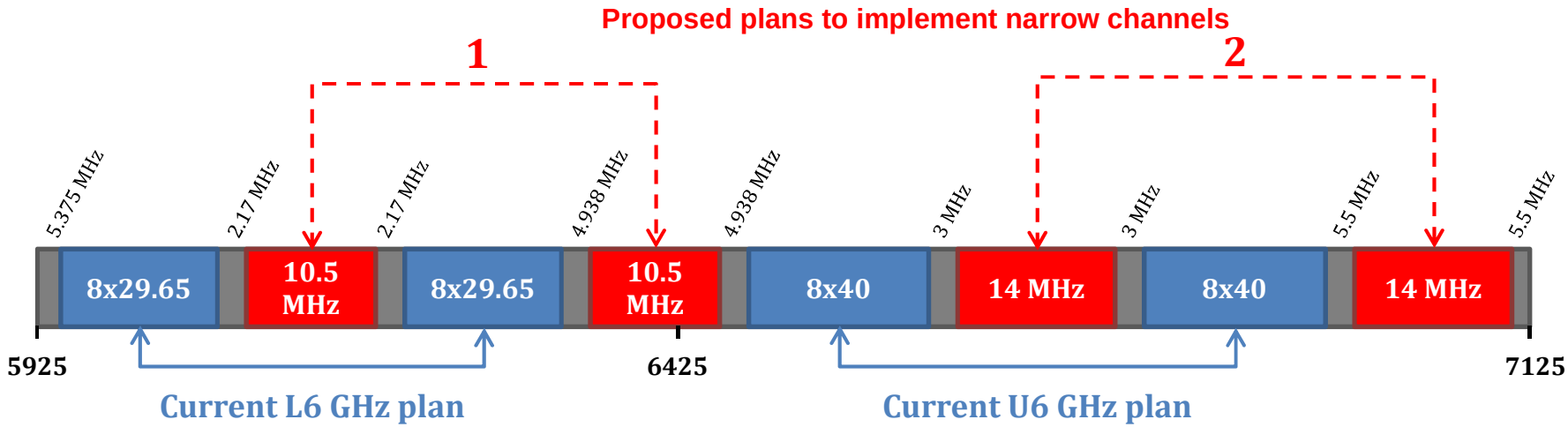

Figure 4: implementation of narrow channels in the lower part of the 6 GHz band and 40 MHz channels in the U6 band

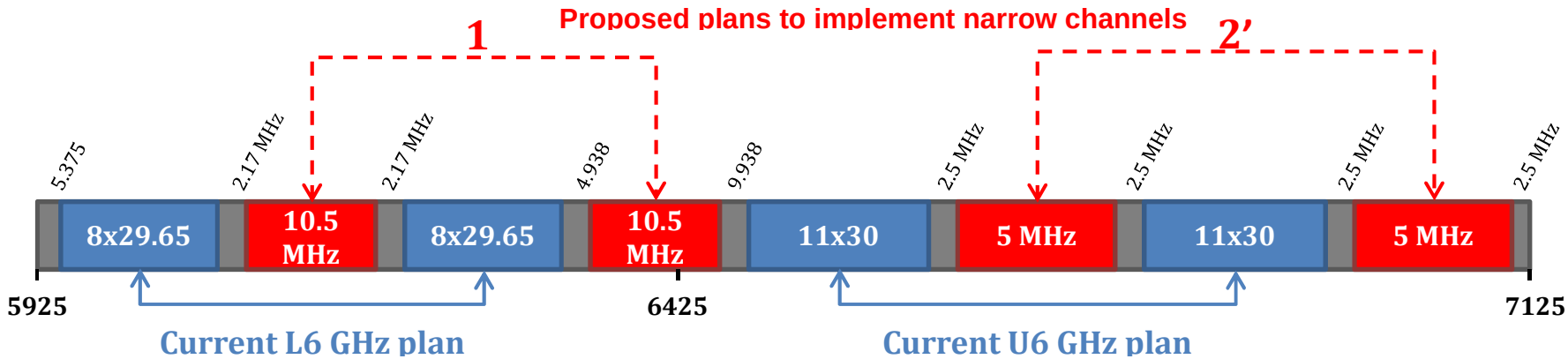

Figure 5: implementation of narrow channels in the lower part of the 6 GHz band and 30 MHz channels in the U6 band

ANNEX 4: LIST OF REFERENCE

[1] CEPT/ERC/Recommendation 14-01E: radio-frequency channel arrangements for high capacity analogue and digital radio-relay systems operating in the band 5925 MHz – 6425 MHz.
[2] CEPT/REC/Recommendation 14-02E: radio-frequency channel arrangements for high, medium and low capacity digital fixed service systems operating in the band 6425-7125 MHz.
[3] etc.