TTC DSL 専門委員会スペクトル管理 SWG

SMS-06-GSV-03
原版：英語

日付：2003 年 12 月 5 日
提出元： GlobespanVirata, Inc.
題名：EU-C 上り拡張の干渉について

ABSTRACT

The present contribution evaluates the Impact of CTLM Extended Upstream Systems defined in [1] and [2], into Annex Abis FDM and Annex Abis overlap.

According to the simulations, the Annex Abis FDM Downstream relative percentage rate Loss due to EU-64 is increasing from ~13% up to ~40% between 2km and 3.5km. Up to 3.5km, the maximum downstream relative percentage rate loss due to GSV EU [4] is only ~15%.

These numbers mean that CTLM EU seriously impacts the downstream performance of essential DSL systems in Japan. Spectral compatibility of CTLM EU should therefore be questioned.

GSV EU system [4] demonstrates a much better compromise than CTLM EU between Upstream performance improvement and impact into downstream channels of already deployed systems.

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1 Introduction

The present contribution evaluates the Impact of Extended Upstream Systems defined in [1] and [2] into Annex Abis FDM, Annex Abis Overlap. Section 2 & 3 details the Upstream and Downstream masks features. Simulation conditions are given in section 4. Impact is checked in section 5.

2 Extended Upstream Mask Definition

Figure 1 and Table 1 detail the extended upstream PSD mask copied from G.992.5 Annex M. The parameters for the family of PSDs in Table 1 are proposed for the FEXT bitmap, and those in Table 2 are proposed for the NEXT bitmap.

Figure 1. EU g.992.5 Annex M EU Peak values, from [2]

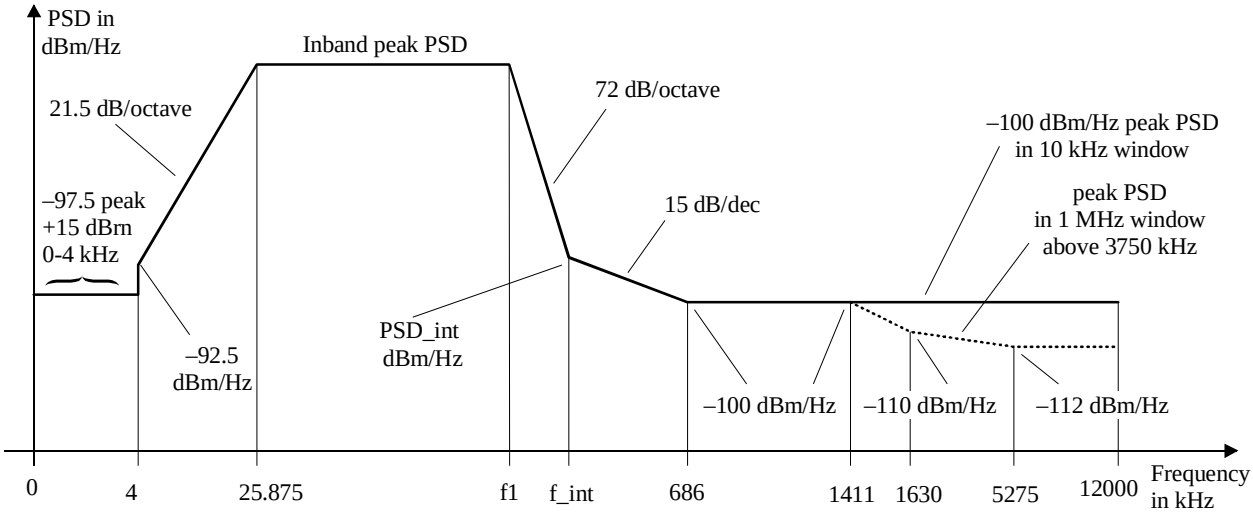


Table 1. From [2] Annex M g.992.5 EU masks

Frequency (kHz)	PSD level (dBm/Hz)	Measurement BW
0	-97.5	100 Hz
4	-97.5	100 Hz
4	-92.5	100 Hz
10	interpolated	10 kHz
25.875	Inband_peak_PSD	10 kHz
f1	Inband_peak_PSD	10 kHz
f_int	PSD_int	10 kHz
686	-100	10 kHz
5275	-100	10 kHz
12000	-100	10 kHz

Table 2. From [2] Parameters for Annex C extended upstream in FEXT bitmap

Upstream Mask-Number	***2.1 Designator***	**Template Nominal PSD P_0 (dBm/Hz)**	**Template Maximum Aggregate Transmit Power (dBm)**	**Inband Peak PSD (dBm/Hz)**	**Frequency *f1* (kHz)**	**Intercept Frequency *f_int* (kHz)**	**Intercept PSD Level *PSD_int* (dBm/Hz)**
1	EU-32	-38.0	12.5	-34.5	138.00	242.92	-93.2
2	EU-36	-38.5	12.5	-35.0	155.25	274.03	-94.0
3	EU-40	-39.0	12.5	-35.5	172.50	305.06	-94.7
4	EU-44	-39.4	12.5	-35.9	189.75	336.33	-95.4
5	EU-48	-39.8	12.5	-36.3	207.00	367.54	-95.9
6	EU-52	-40.1	12.5	-36.6	224.25	399.07	-96.5
7	EU-56	-40.4	12.5	-36.9	241.50	430.58	-97.0
8	EU-60	-40.7	12.5	-37.2	258.75	462.04	-97.4
9	EU-64	-41.0	12.5	-37.5	276.00	493.45	-97.9

Table 3: from [2] Parameters for Annex C extended upstream in NEXT bitmap

Upstream Mask-Number	***2.2 Designator***	**Template Nominal PSD P_0 (dBm/Hz)**	**Template Maximum Aggregate Transmit Power (dBm)**	**Inband Peak PSD (dBm/Hz)**	**Frequency *f1* (kHz)**	**Intercept Frequency *f_int* (kHz)**	**Intercept PSD Level *PSD_int* (dBm/Hz)**
1	EU-32	-38	12.5	-34.5	138.00	242.92	-93.2
2	EU-36	-38.7	12.5	-35.2	155.25	273.47	-94.0
3	EU-40	-39.9	12.5	-36.4	172.50	302.26	-94.7
4	EU-44	-40.7	12.5	-37.2	189.75	331.87	-95.3
5	EU-48	-41.4	12.5	-37.9	207.00	361.55	-95.8
6	EU-52	-41.8	12.5	-38.3	224.25	392.16	-96.4
7	EU-56	-42.1	12.5	-38.6	241.50	423.12	-96.9
8	EU-60	-42.3	12.5	-38.8	258.75	454.51	-97.3
9	EU-64	-42.3	12.5	-38.8	276.00	486.91	-97.8

Note. There is an inconsistency between Figure 1 and Tables 2 and 3 regarding the slope of the low frequency edge of the Extended Upstream Systems. According to Figure 1, the slope should be constant and equal to 21.5dB/octave. Since the PSD flat peak value changes and since the corner point at 4Khz and the cut-off frequency of 25.875KHz are fixed, then the slope should change. Table 4 gives the slope value of the low frequency edge for both NEXT and FEXT Bit map consistent with tables 2 and 3.

Table 4. Slopes of the Low frequency edge

System	FEXT Slope dB/Oct	NEXT Slope dB/Oct
EU-32	21.53	21.53
EU-36	21.34	21.27
EU-40	21.16	20.82
EU-44	21.01	20.53
EU-48	20.86	20.27
EU-52	20.75	20.12
EU-56	20.64	20.01
EU-60	20.53	19.93
EU-64	20.41	19.93

3 Downstream Masks used

To evaluate the impact of EU systems, the g.992.1 FDM downstream mask is considered, as in [2]. Pilot Tone 64 is not loaded.

4 Simulation Conditions

4.1 Loop

0.4mm Poly, Loops should be 0 – 5km with a 250 meter step size.

4.2 Noise Conditions

For each of the tested system 2 Noise conditions are considered:

- *Reference.* Each system is disturbed by one SELF cross talk deployed in the same quad.
- *Impact.* Each system is disturbed by one Intra-Quad EU Systems (Two EU systems are considered EU-48 and EU-64).

4.3 NEXT & FEXT Coupling

99%

NEXT: 50.5dB

FEXT: 54dB

4.4 CPE Injection Points

All the cross talks are co-located at the CPE.

4.5 Simulation Tunings

Generic Tunings, see Table 5.

Table 5. Simulation Tunings

Margin	6dB
Bit Loading Range	2 bits to 15 bits
Cut back	Power Cut back OFF
Echo	70dB attenuation

Bit Loading, Channel coding[1] and payload Rate calculation, see [3].

[1] A slight modification has been introduced to take into account an odd number of 2D symbols.

5 Simulation Results

5.1 Systems Evaluated

- Annex Abis FDM
- Annex Abis Overlap

5.2 Simulations Summary

Table 6 gives the Impact simulations summary.

Table 6. EU Impact, Simulations Summary

Disturbers / Systems	Reference (SELF) 1 Intra 99%	EU-64 1 intra 99%
Annex Abis fdm	rate vs reach DS, US	rate vs reach DS, US
AnnexAbis OL	rate vs reach DS, US	rate vs reach DS, US

5.3 Simulation results

Figure 2 to 5 display the simulation results according to table 6. According to figure 4, the Downstream relative percentage rate Loss due to EU-64 is increasing from ~13% up to ~40% between 2km and 3.5km. Up to 3.5km the maximum Downstream relative percentage rate loss due to GSV EU [4] is only ~15%.

Figure 2. Annex Abis FDM Downstream performance, 1 Intra-Quad Disturber (99%) SELF versus EU-64

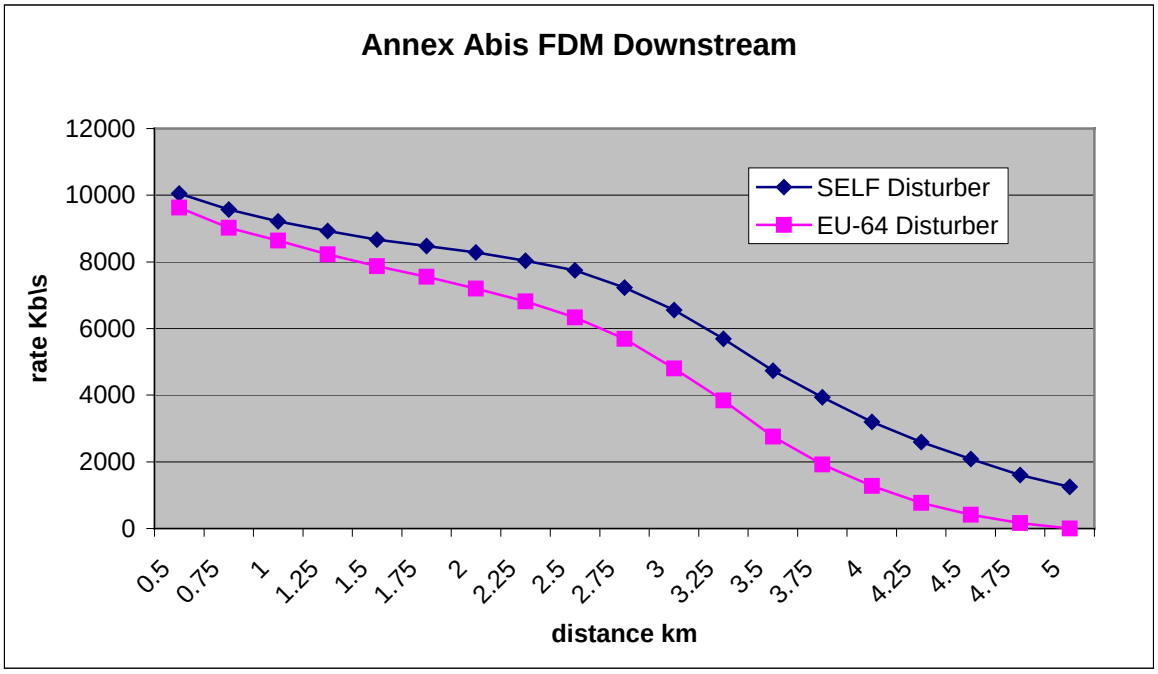


Figure 3. Annex Abis OL Downstream performance, 1 Intra-Quad Disturber (99%) SELF versus EU-64

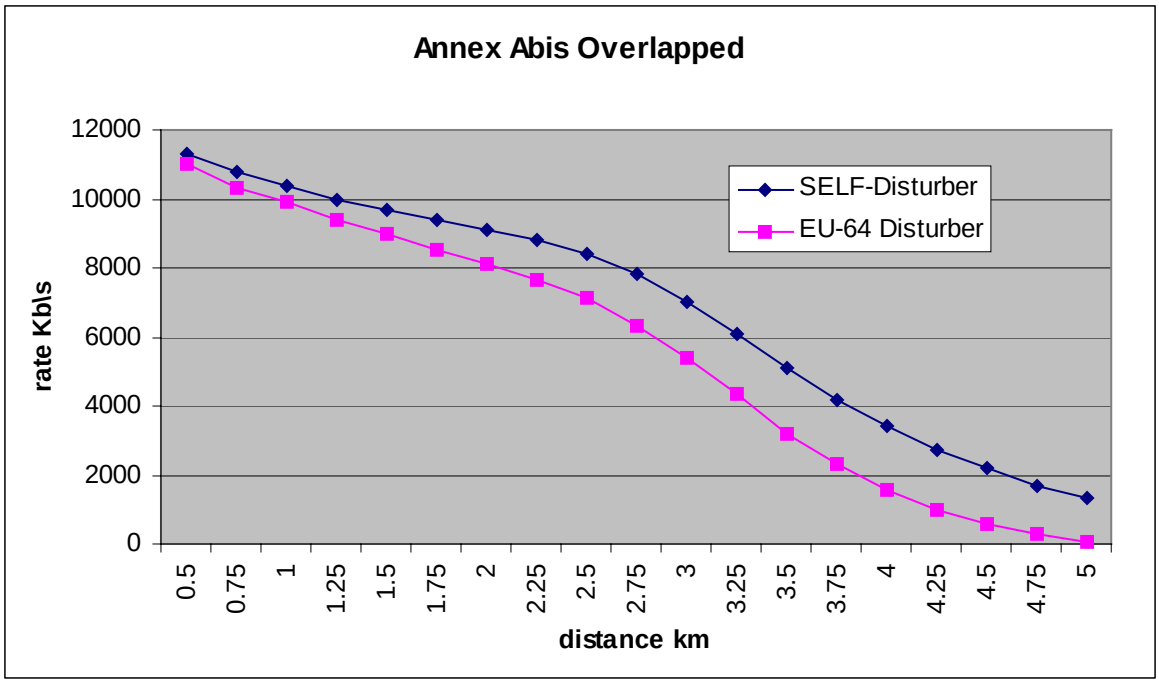


Figure 4. relative Loss of Annex Abis FDM DS and Annex Annex Abis OL DS due to EU-64, versus SELF

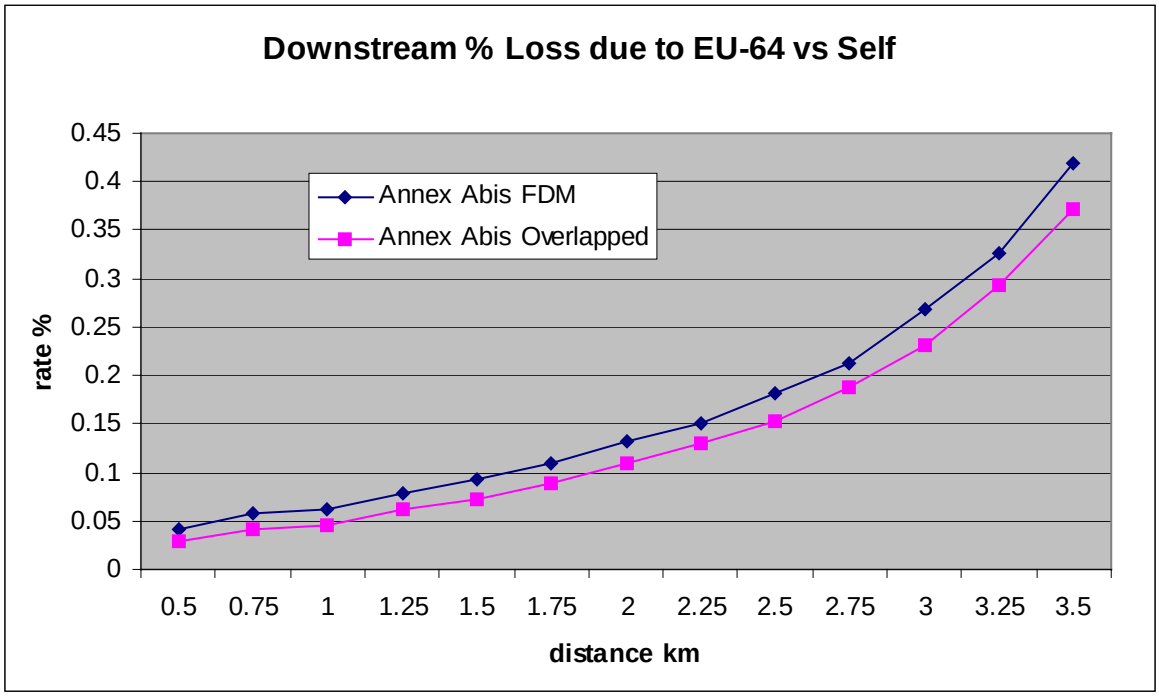
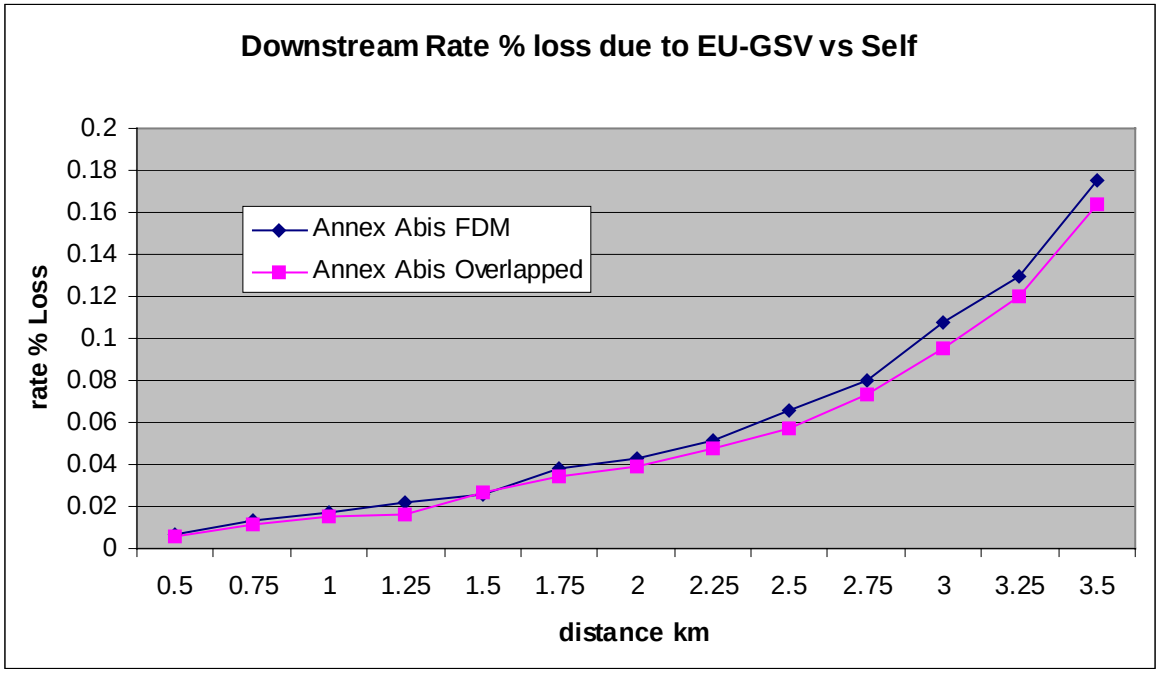


Figure 5. relative performance Loss of Annex Abis FDM DS and Annex Annex Abis OL DS due to EU-GSV [4], versus SELF



6 Conclusions

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7 References

[1]SKS03-CTLM02, “Comparison of Extended Upstream proposals”, Centililium Communications, Tokyo, Japan, Septem

[2] SMS05-CTLM-01, "Update of Extended Upstream proposal", Centilium Communications, Tokyo, November 21, 200

[3] SKS-03-CTLM-01, "Extended Upstream performance Criteria", Centilium Communications, Tokyo, September 29-30

[4]SKS-03-GSV04, “3/50 Spectral Compatibility revision r1”, GlobespanVirata, Tokyo, September 29-30, 2003.