ANNEXURE F: DTT FREQUENCY NETWORKS 2009

No	TRANSMITTING STATION NAME	GEO. CO-ORDINATES		Frequency		Antenna		Administrative Records	
		LONGITUDE	LATITUDE	CH	MHz	ERP(kW)	POL	STAT	MUX
333	PRETORIA	027E59 03	25S4120	54	738	28.1	H	SPA	DTT1
334	PRETORIA	027E59 03	25S4120	58	770	84.6	H	SPA	DTT2
335	PRETORIA NORTH	028E10 07	25S41 25	54	738	0.25	V	SPA	DTT1
336	PRETORIA NORTH	028E10 07	25S41 25	58	770	0.25	V	SPA	DTT2
337	PRIESKA	022E36 57	29S40 52	22	482	50	H	SPA	DTT1
338	PRIESKA	022E36 57	29S40 52	30	546	50	H	SPA	DTT2
339	PUNDA MARIA	030E59 19	22S43 28	32	562	10	H	SPA	DTT1
340	PUNDA MARIA	030E59 19	22S43 28	36	594	10	H	SPA	DTT2
341	QUDENI	030E51 59	28S38 03	60	786	1	V	SPA	DTT1
342	QUDENI	030E51 59	28S38 03	56	754	1	V	SPA	DTT2
343	QUEENSTOWN	026E47 05	31S43 56	26	514	50	H	SPA	DTT1
344	QUEENSTOWN	026E47 05	31S43 56	30	546	50	H	SPA	DTT2
345	QUEENSTOWN (DORP	026E47 05	31S43 56	26	514	0.25	V	SPA	DTT1
346	QUEENSTOWN (DORP	026E47 05	31S43 56	30	546	0.25	V	SPA	DTT2
347	RICHARDS BAY	032E06 24	28S47 10	60	786	0.19	V	SPA	DTT1
348	RICHARDS BAY	032E06 24	28S47 10	56	754	0.19	V	SPA	DTT2
349	RIVERSDALE	021E07 41	34S01 07	32	562	20	H	SPA	DTT1
350	RIVERSDALE	021E07 41	34S01 07	36	594	20	H	SPA	DTT2
351	RUSTENBURG	027E07 06	25S36 56	45	666	1	H	SPA	DTT1
352	RUSTENBURG	027E07 06	25S36 56	53	730	5	H	SPA	DTT2
353	RUSTENBURG (CASH/	027E07 06	25S36 56	45	666	0.1	V	SPA	DTT1
354	RUSTENBURG (CASH/	027E07 06	25S36 56	53	730	0.1	V	SPA	DTT2
355	SABIE	030E45 34	25S07 44	23	490	0.1	V	SPA	DTT1
356	SABIE	030E45 34	25S07 44	27	522	0.1	V	SPA	DTT2
357	SASOLBURG	027E49 35	26S47 45	37	602	0.05	V	SPA	DTT1
358	SASOLBURG	027E49 35	26S47 45	45	666	0.05	V	SPA	DTT2
359	SCHWEIZER RENEKE	025E13 07	27S08 13	21	474	10	H	SPA	DTT1
360	SCHWEIZER RENEKE	025E13 07	27S08 13	40	626	10	H	SPA	DTT2
361	SEA POINT	018E23 51	33S54 33	38	610	0.4	V	SPA	DTT1
362	SEA POINT	018E23 51	33S54 33	50	706	0.4	V	SPA	DTT2
363	SECUNDA	029E12 10	26S29 40	44	658	0.1	V	SPA	DTT1
364	SECUNDA	029E12 10	26S29 40	40	626	0.1	V	SPA	DTT2
365	SENEKAL	027E30 26	28S15 19	50	706	10	H	SPA	DTT1
366	SENEKAL	027E30 26	28S15 19	62	738	1	H	SPA	DTT2
367	SEVERN	023E04 00	26S24 00	48	690	10	H	SPA	DTT1
368	SEVERN	023E04 00	26S24 00	52	722	10	H	SPA	DTT2
477	SHANZHA	030E14 00	22S57 36	36	594	2	V	SPA	DTT1
478	SHANZHA	030E14 00	22S57 36	32	562	2	V	SPA	DTT2
369	SIBASA	030E26 54	22S56 57	36	594	8	V	SPA	DTT1
370	SIBASA	030E26 54	22S56 57	32	562	8	V	SPA	DTT2
371	SIMONSTOWN	018E25 37	34S11 54	38	610	0.25	V	SPA	DTT1
372	SIMONSTOWN	018E25 37	34S11 54	50	706	0.25	V	SPA	DTT2
373	SMITHFIELD	026E21 56	29S55 43	29	538	50	H	SPA	DTT1
374	SMITHFIELD	026E21 56	29S55 43	59	778	50	H	SPA	DTT2
375	SOMERSET EAST	025E34 41	32S42 45	61	794	0.05	V	SPA	DTT1
376	SOMERSET EAST	025E34 41	32S42 45	65	826	0.05	V	SPA	DTT2
377	SPRINGBOK	017E48 29	29S35 04	21	474	10	H	SPA	DTT1
378	SPRINGBOK	017E48 29	29S35 04	25	506	10	H	SPA	DTT2

ANNEXURE F: DTT FREQUENCY NETWORKS 2009

No	TRANSMITTING STATION NAME	GEO. CO-ORDINATES		Frequency		Antenna		Administrative Records	
		LONGITUDE	LATITUDE	CH	MHz	ERP(kW)	POL	STAT	MUX
379	SPRINGFONTEIN	025E46 08	30S16 14	42	642	10	H	SPA	DTT1
380	SPRINGFONTEIN	025E46 08	30S16 14	46	674	10	H	SPA	DTT2
381	STANDERTON	029E12 51	26S57 37	42	642	0.1	V	SPA	DTT1
382	STANDERTON	029E12 51	26S57 37	46	674	0.1	V	SPA	DTT2
383	STEINKOPF	017E35 00	29S05 00	38	610	10	H	SPA	DTT1
384	STEINKOPF	017E35 00	29S05 00	42	642	10	H	SPA	DTT2
385	STELLENBOSCH	018E52 11	33S54 56	38	610	0.5	V	SPA	DTT1
386	STELLENBOSCH	018E52 11	33S54 56	50	706	0.5	V	SPA	DTT2
387	STERKSPRUIT	027E16 14	30S41 44	45	666	20	V	SPA	DTT1
388	STERKSPRUIT	027E16 14	30S41 44	49	698	20	V	SPA	DTT2
389	STRAALHOEK	029E50 53	30S20 49	51	714	10	V	SPA	DTT1
390	STRAALHOEK	029E50 53	30S20 49	54	738	10	V	SPA	DTT2
391	SUIDRAND (KROONST	027E14 16	27S41 18	25	506	0.25	V	SPA	DTT1
392	SUIDRAND (KROONST	027E14 16	27S41 18	29	538	0.25	V	SPA	DTT2
393	SUNNYSIDE	028E12 24	25S45 53	54	738	1	V	SPA	DTT1
394	SUNNYSIDE	028E12 24	25S45 53	58	770	1	V	SPA	DTT2
395	SUPINGSTAD	026E01 36	24S47 20	64	818	2	V	SPA	DTT1
396	SUPINGSTAD	026E01 36	24S47 20	68	850	2	V	SPA	DTT2
397	SUTHERLAND	020E34 57	32S25 18	58	770	10	H	SPA	DTT1
398	SUTHERLAND	020E34 57	32S25 18	62	802	10	H	SPA	DTT2
399	SUURBERG	025E34 29	33S14 55	38	610	5	H	SPA	DTT1
400	SUURBERG	025E34 29	33S14 55	42	642	5	H	SPA	DTT2
401	SWARTRUGGENS	026E48 09	25S40 59	47	682	0.5	V	SPA	DTT1
402	SWARTRUGGENS	026E48 09	25S40 59	51	714	0.5	V	SPA	DTT2
403	TABLE MOUNTAIN	018E24 13	33S57 25	38	610	0.25	V	SPA	DTT1
404	TABLE MOUNTAIN	018E24 13	33S57 25	50	706	0.5	V	SPA	DTT2
405	TAUNG	024E37 00	27S31 30	39	618	18	H	SPA	DTT1
406	TAUNG	024E37 00	27S31 30	51	714	174	H	SPA	DTT2
407	THABA NCHU	026E45 45	29S15 24	63	810	2	H	SPA	DTT1
408	THABA NCHU	026E45 45	29S15 24	67	842	2	H	SPA	DTT2
409	THABAZIMBI	027E36 51	24S27 59	46	674	5	H	SPA	DTT1
410	THABAZIMBI	027E36 51	24S27 59	50	706	5	H	SPA	DTT2
411	THE BLUFF	031E00 45	29S54 40	46	674	2.5	V	SPA	DTT1
412	THE BLUFF	031E00 45	29S54 40	50	706	2.5	V	SPA	DTT2
413	THEUNISSEN	026E34 50	28S11 55	30	546	34	H	SPA	DTT1
414	THEUNISSEN	026E34 50	28S11 55	34	578	10	H	SPA	DTT2
415	THLABANE	027E11 39	25S37 16	45	666	0.2	V	SPA	DTT1
416	THLABANE	027E11 39	25S37 16	53	730	1.3	V	SPA	DTT2
417	TOLWE	028E27 29	23S04 59	47	682	16	V	SPA	DTT1
418	TOLWE	028E27 29	23S04 59	51	714	16	V	SPA	DTT2
419	TOUWSRIVIER	020E01 12	33S20 59	32	562	0.02	V	SPA	DTT1
420	TOUWSRIVIER	020E01 12	33S20 59	36	594	0.02	V	SPA	DTT2
421	TSHAMAVUDZI	030E31 42	22S39 15	36	594	0.25	V	SPA	DTT1
422	TSHAMAVUDZI	030E31 42	22S39 15	32	562	0.25	V	SPA	DTT2
423	TYGERBERG	018E35 46	33S52 29	38	610	2	V	SPA	DTT1
424	TYGERBERG	018E35 46	33S52 29	50	706	2	V	SPA	DTT2
425	TZANEEN	030E00 17	23S47 06	58	770	20	H	SPA	DTT1
426	TZANEEN	030E00 17	23S47 06	62	802	20	H	SPA	DTT2

ANNEXURE F: DTT FREQUENCY NETWORKS 2009

No	TRANSMITTING STATION NAME	GEO. CO-ORDINATES		Frequency		Antenna		Administrative Records	
		LONGITUDE	LATITUDE	CH	MHz	ERP(kW	POL	STAT	MUX
427	UBOMBO	032E04 52	27S33 42	53	730	10	H	SPA	DTT1
428	UBOMBO	032E04 52	27S33 42	57	762	10	H	SPA	DTT2
429	UGIE	027E58 26	31S11 28	39	618	0.5	V	SPA	DTT1
430	UGIE	027E58 26	31S11 28	43	650	0.5	V	SPA	DTT2
431	ULUNDI	031E23 38	28S27 00	60	786	10	V	SPA	DTT1
432	ULUNDI	031E23 38	28S27 00	56	754	10	V	SPA	DTT2
433	UMTATA	028E44 36	31S35 48	41	634	10	H	SPA	DTT1
434	UMTATA	028E44 36	31S35 48	34	578	10	H	SPA	DTT2
435	UNIONDALE	023E03 06	33S43 23	55	746	2.5	V	SPA	DTT1
436	UNIONDALE	023E03 06	33S43 23	36	594	1	V	SPA	DTT2
437	UNIONDALE (TOWN)	023E03 06	33S43 23	36	594	1	V	SPA	DTT1
438	UNIONDALE (TOWN)	023E03 06	33S43 23	55	746	1	V	SPA	DTT2
439	UPINGTON	021E44 12	28S52 56	33	570	50	H	SPA	DTT1
440	UPINGTON	021E44 12	28S52 56	29	538	50	H	SPA	DTT2
441	UPINGTON TOWN	021E12 00	28S30 25	29	538	0.4	V	SPA	DTT1
442	UPINGTON TOWN	021E12 00	28S30 25	33	570	0.38	V	SPA	DTT2
443	VAN RHYNSDORP	018E41 24	31S45 16	48	690	50	H	SPA	DTT1
444	VAN RHYNSDORP	018E41 24	31S45 16	52	722	50	H	SPA	DTT2
445	VANWYKSVLEI	021E34 00	30S13 00	36	594	50	H	SPA	DTT1
446	VANWYKSVLEI	021E34 00	30S13 00	28	530	50	H	SPA	DTT2
447	VERULAM	031E02 19	29S38 25	46	674	0.01	V	SPA	DTT1
448	VERULAM	031E02 19	29S38 25	50	706	0.01	V	SPA	DTT2
449	VICTORIA WEST	023E13 50	31S41 15	43	650	5	H	SPA	DTT1
450	VICTORIA WEST	023E13 50	31S41 15	47	682	5	H	SPA	DTT2
451	VILLA NORA	028E21 00	23S42 00	24	498	5	H	SPA	DTT1
452	VILLA NORA	028E21 00	23S42 00	28	530	5	H	SPA	DTT2
453	VILLIERSDORP	019E30 25	33S58 09	53	730	20	H	SPA	DTT1
454	VILLIERSDORP	019E30 25	33S58 09	65	826	20	H	SPA	DTT2
455	VOLKSRUST	029E53 15	27S18 33	58	770	1	H	SPA	DTT1
456	VOLKSRUST	029E53 15	27S18 33	62	802	1	H	SPA	DTT2
457	VRYHEID	030E47 38	27S44 27	26	514	10	H	SPA	DTT1
458	VRYHEID	030E47 38	27S44 27	30	546	10	H	SPA	DTT2
475	VRYHEID TOWN	030E46 23	27S46 44	26	514	0.04	H	SPA	DTT1
476	VRYHEID TOWN	030E46 23	27S46 44	30	546	0.04	H	SPA	DTT2
459	WELVERDIEND	027E14 55	26S26 47	23	490	5	H	SPA	DTT1
460	WELVERDIEND	027E14 55	26S26 47	31	554	5	H	SPA	DTT2
461	WILLISTON	020E55 08	31S19 31	38	610	10	H	SPA	DTT1
462	WILLISTON	020E55 08	31S19 31	46	674	10	H	SPA	DTT2
463	WILLOWMORE	023E27 36	33S14 05	39	618	1	H	SPA	DTT1
464	WILLOWMORE	023E27 36	33S14 05	51	714	1	H	SPA	DTT2
465	WINDYRIDGE	027E14 05	32S45 10	45	666	20	H	SPA	DTT1
466	WINDYRIDGE	027E14 05	32S45 10	49	698	20	H	SPA	DTT2
467	WITSIESHOEK	028E50 52	28S31 02	34	562	0.25	V	SPA	DTT1
468	WITSIESHOEK	028E50 52	28S31 02	36	594	0.25	V	SPA	DTT2
469	ZEERUST	026E02 51	25S51 37	39	618	10	H	SPA	DTT1
470	ZEERUST	026E02 51	25S51 37	36	594	10	H	SPA	DTT2

ANNEXURE G: Mobile DTT Frequency Networks

ANNEXURE G: DVB-H FREQUENCIES

	TRANSMITTING	GEO. CO-ORDINATES		FREQUENCY		ANTENNA		ADMIN RECORDS	
NO	STATION NAME	LONGITUDE	LATITUDE	CH	MHz	ERP(kW)	POL	STAT	MUX
1	AMANDA GLEN	018E40 33	33S51 18	28	530	0.2512	V		MDTT1
2	AMANDA GLEN	018E40 33	33S51 18	32	562	0.2512	V		MDTT2
3	AURORA	018E38 29	33S49 39	28	530	0.2512	V		MDTT1
4	AURORA	018E38 29	33S49 39	32	562	0.2512	V		MDTT2
5	BEZ VALLEY	028E05 04	26S11 41	35	586	0.2512	V		MDTT1
6	BEZ VALLEY	028E05 04	26S11 41	33	570	0.2512	V		MDTT2
7	BLOEMFONTEIN	026E13 50	29S06 13	33	570	50	H		MDTT1
8	BLOEMFONTEIN	026E13 50	29S06 13	47	682	50	H		MDTT2
9	CAPE TOWN	018E23 15	34S03 15	32	562	6.7999	H		MDTT2
10	CAPE TOWN	018E23 15	34S03 15	28	530	6.7999	H		MDTT1
11	DURBAN	030E43 00	29S46 11	33	570	199.526	H		MDTT1
12	DURBAN	030E43 00	29S46 11	25	506	12.2999	H		MDTT2
13	DURBAN NORTH	031E02 24	29S45 52	33	570	1	V		MDTT1
14	DURBAN NORTH	031E02 24	29S45 52	25	506	1	V		MDTT2
15	EAST LONDON	027E48 58	32S56 20	32	562	10	H		MDTT2
16	EAST LONDON	027E48 58	32S56 20	36	594	10	H		MDTT1
17	FISHHOEK	018E26 12	34S08 59	28	530	0.2512	V		MDTT1
18	FISHHOEK	018E26 12	34S08 59	32	562	0.2512	V		MDTT2
19	GEORGE	022E27 04	33S55 38	37	602	112	H		MDTT1
20	GEORGE	022E27 04	33S55 38	41	634	112	H		MDTT2
21	GRABOUW	018E58 03	34S06 05	28	530	0.5	V		MDTT1
22	GRABOUW	018E58 03	34S06 05	32	562	0.5	V		MDTT2
23	HELDERKRUIN	027E51 32	26S06 05	35	586	0.8	V		MDTT1
24	HELDERKRUIN	027E51 32	26S06 05	33	570	0.8	V		MDTT2
25	HOUT BAY	018E20 56	34S00 44	28	530	4.0004	V		MDTT1
26	HOUT BAY	018E20 56	34S00 44	32	562	4.0004	V		MDTT2
27	JOHANNESBURG	028E00 26	26S11 31	35	586	120.005	H		MDTT1
28	JOHANNESBURG	028E00 26	26S11 31	33	570	120.005	H		MDTT2
29	KIMBERLEY	024E54 19	28S51 14	38	610	50	H		MDTT1
30	KIMBERLEY	024E54 19	28S51 14	45	666	50	H		MDTT2
31	KLERKSDORP	026E24 29	26S45 14	24	498	5	H		MDTT1
32	KLERKSDORP	026E24 29	26S45 14	28	530	5	H		MDTT2
33	MENLO PARK	028E16 09	25S46 15	35	586	0.2512	V		MDTT1
34	MENLO PARK	028E16 09	25S46 15	33	570	0.2512	V		MDTT2
35	MIDDELBURG	029E23 24	25S49 04	27	522	10	H		MDTT2
36	MIDDELBURG	029E23 24	25S49 04	31	554	10	H		MDTT1
37	MONDEOR	027E59 34	26S16 52	35	586	0.2512	V		MDTT1
38	MONDEOR	027E59 34	26S16 52	33	570	0.2512	V		MDTT2
39	MULBARTON	028E03 56	26S17 36	35	586	0.2512	V		MDTT1
40	MULBARTON	028E03 56	26S17 36	33	570	0.2512	V		MDTT2
41	NELSPRUIT	030E46 35	25S30 55	45	666	50	H		MDTT1
42	NELSPRUIT	030E46 35	25S30 55	48	690	50	H		MDTT2
43	OVERPORT	030E59 54	29S50 02	33	570	1.2999	V		MDTT1
44	OVERPORT	030E59 54	29S50 02	25	506	1.2999	V		MDTT2
45	PAARL	018E56 24	33S42 53	28	530	2.4998	V		MDTT1
46	PAARL	018E56 24	33S42 53	32	562	2.4998	V		MDTT2
47	PIETERMARITZBURG	030E19 49	29S34 47	33	570	1	V		MDTT1
48	PIETERMARITZBURG	030E19 49	29S34 47	25	506	1	V		MDTT2

ANNEXURE G: DVB-H FREQUENCIES

49	Pietersburg	029E27 54	23S53 10.	34	578	5	H		MDTT1
50	Pietersburg	029E27 54	23S53 10.	39	618	5	H		MDTT2
51	PORT ELIZABETH	025E26 29	33S56 10	28	530	10	H		MDTT1
52	PORT ELIZABETH	025E26 29	33S56 10	32	562	10	H		MDTT2
53	PRETORIA	027E59 03	25S41 20	35	586	100	H		MDTT1
54	PRETORIA	027E59 03	25S41 20	33	570	100	H		MDTT2
55	PRETORIA NORTH	028E10 07	25S41 25	35	586	0.2512	V		MDTT1
56	PRETORIA NORTH	028E10 07	25S41 25	33	570	0.2512	V		MDTT2
57	RUSTENBURG	027E07 06	25S36 56	49	698	5	H		MDTT1
58	SEA POINT	018E29 19	33S56 09	28	530	0.4	V		MDTT1
59	SEA POINT	018E29 19	33S56 09	32	562	0.4	V		MDTT2
60	SIMONSTOWN	018E25 37	34S11 54	28	530	0.2512	V		MDTT1
61	SIMONSTOWN	018E25 37	34S11 54	32	562	0.2512	V		MDTT2
62	STELLENBOSCH	018E52 11	33S54 56	28	530	0.2512	V		MDTT1
63	STELLENBOSCH	018E52 11	33S54 56	32	562	0.2512	V		MDTT2
64	SUNNYSIDE	028E12 24	25S45 53	35	586	1	V		MDTT1
65	SUNNYSIDE	028E12 24	25S45 53	33	570	1	V		MDTT2
66	TABLE MOUNTAIN	018E24 13	33S57 25	28	530	0.2512	V		MDTT1
67	TABLE MOUNTAIN	018E24 13	33S57 25	32	562	0.5	V		MDTT2
68	THE BLUFF	031E00 45	29S54 40	33	570	2.4998	V		MDTT1
69	THE BLUFF	031E00 45	29S54 40	25	506	2.4998	V		MDTT2
70	THEUNISSEN	026E34 50	28S11 55	39	618	50	H		MDTT1
71	THEUNISSEN	026E34 50	28S11 55	43	650	50	H		MDTT2
72	TYGERBERG	018E35 46	33S52 29	28	530	1.9999	V		MDTT1
73	TYGERBERG	018E35 46	33S52 29	32	562	1.9999	V		MDTT2

ANNEXURE H: Proposed Frequency Changes

Annexure H: Proposed Frequency Changes 2009

No.	STATION NAME	GEO.CO-ORDINATES		FREQUENCY			New Freq	New	ANTENNA		ADMINISTRATIVE RECORDS		
		LONGITUDE	LATITUDE	CH	FREQ(MHz)	OFFSET	MHz	CH	ERP(kW)	POL	PROG	STAT	CAT
1	PRETORIA NORTH	028E10 07	25S41 25	54	735.25	20	751.25	56	0.25	V	CSN	OPE	CML
2	STENBURG CASH	027E14 33	25S41 26	54	735.25	0	551.25	31	0.1	V	MNET	OPE	CML
3	TABLE MOUNTAIN	018E24 13	33S57 25	28	511.25	0	647.25	43	0.46	V	SABC1	OPE	PBS
5	LINMEYER	028E04 16	26S16 08	35	583.25	0	535.25	29	0.002	H	MNET	OPE	CML
6	VERULAM	031E02 19	29S38 25	25	503.25	0	487.25	23	0.01	V	SBC1	OPE	PBS
7	VERULAM	031E02 19	29S38 25	33	567.25	0	519.25	27	0.01	V	ETV	OPE	CML
8	SUIDRAND	027E14 16	27S41 18	25	503.25	0	591.25	36	0.25	V	MNET	OPE	CML
9	HOWICK	030E13 52	29S30 13	25	503.25	0	735.25	54	0.008	V	SBC1	OPE	PBS

ANNEXURE I: Digital Planning Parameters

ANNEXURE I

1. Digital Planning Parameters

The Technical standards and transmission characteristics for digital broadcasting will be in accordance with the GE06 plan. These Technical standards and transmission characteristics parameters will be used for all digital television coverage and interference planning. Generally the following parameters will used as the basis for the reference network. The following table clearly depicts the reference parameters as tabulated in the final act of ITU RRC-06 for digital network planning:

Table 1. FINAL ACTS OF ITU RRC-06 REFENCE PARAMETERS

Details	Final Acts of ITU RRC-06	Page Number
Definitions	CHAPTER 1 TO ANNEX 2	42-48
Propagation information	CHAPTER 2 TO ANNEX 2	49-78
Technical basis for the terrestrial broadcasting service Frequency bands, reception modes, antenna considerations, location correction factors, out-of-band spectrum masks	CHAPTER 3 TO ANNEX 2	160-171
System variants, channel numbering and channel boundaries,	Annex 3.1	172-183
C/N values and minimum median field-strength values of different DVB-T system variants for different reception conditions	ANNEX 3.2	184-185
Protection ratios for terrestrial broadcasting systems	ANNEX 3.3	186-200
Calculating of minimum median field strength	ANNEX 3.4	201-202
Reference planning configurations	ANNEX3.5	203-204
Reference networks	ANNEX 3.6	205-212
Calculating of interference for single frequency networks and allotments	ANNEX 3.7	213

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Figure.1 MODULATION STANDARDS, EMISSION BROADCASTING CHARECTERISTICS OF THE RADIATED SIGNAL FOR DIGITAL BROADCASTING

<table>
<tr><td colspan="7">2 CHARACTERISTICS</td></tr>
<tr><td>Nominal radio-frequency channel bandwidth (MHz)</td><td colspan="6">8</td></tr>
<tr><td>Nominal width of digital signal (MHz)</td><td colspan="6">7.61</td></tr>
<tr><td>Type of modulation</td><td colspan="6">COFDM</td></tr>
<tr><td rowspan="2">Number of carrier per channel</td><td colspan="3">3 8K MODE</td><td colspan="3">4 2K MODE</td></tr>
<tr><td colspan="3">6817</td><td colspan="3">1705</td></tr>
<tr><td rowspan="2">Carrier spacing</td><td colspan="3">5 8K MODE</td><td colspan="3">6 2K MODE</td></tr>
<tr><td colspan="3">1 kHz</td><td>4 kHz</td><td></td></tr>
<tr><td>Forward error correction rates (FEC)</td><td>1/2</td><td>2/3</td><td>3/4</td><td>5/6</td><td>7/8</td></tr>
<tr><td>Guard interval</td><td>1/32</td><td colspan="2">1/16</td><td>1/8</td><td>1/4</td></tr>
<tr><td>Carrier modulation scheme</td><td>64 QAM</td><td colspan="2">16-QAM</td><td colspan="2">QSPK</td></tr>
<tr><td rowspan="3">Hierarchical modulation</td><td>α = 1</td><td colspan="2">α = 2</td><td colspan="2">α = 4</td></tr>
<tr><td rowspan="2">Non-hierarchical</td><td colspan="2">-QPSK in non-uniform 16 QAM</td><td colspan="2">-QPSK in non-uniform 16 QAM</td></tr>
<tr><td colspan="2">-QPSK in non-uniform 64-QAM</td><td colspan="2">-QPSK in non-uniform 64-QAM</td></tr>
</table>

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2. Single Frequency Networks

SFN operation

The Final Acts of RRC-06 define a Single Frequency Network as "*A network of synchronized transmitting stations radiating identical signals in the same RF channel. SFNs are particularly suited to provide coverage of medium to large areas within which it is intended to provide a common set of programmes with all transmitters synchronized on a single frequency*"[1] (emphasis added)

SFNs offer greatly increased frequency efficiency as summarized in Figure 1 and transmitters operating within delay limits result in mutual addition of the signal powers at the receive point and thus network gain.

Self-interference in SFNs

The deployment of single frequency networks provides increased spectrum efficiency,, however, two restrictions must be adhered to limit the extent of the self interference in the network.*"Firstly, for a given receiving location, the main contributing signals in an SFN come from the nearby transmitters. In order to keep these contributions constructive the time delay between them must not exceed the guard interval to any significant extent, which means that neighbouring transmitters have to keep a certain upper limit for the distance between them.*

Secondly, even if the maximum separation distance for neighbouring transmitters is kept, more distant transmitters in the network may contribute destructively in such a way that ***a maximum size of the SFN service area must not be exceeded*** *in order to keep the number of relevant self-interfering transmitters small.*

The significance of self-interference, the resulting maximum separation distance between neighbouring transmitters and whether there is an overall maximum size of the SFN service area depends on the chosen guard interval, the sensitivity of the system with regard to self-interference (indicated by the relevant C/N value) and the density of the transmitters in the network.[2] (emphasis added).

[1] *Technical criteria of Digital Video Broadcasting Terrestrial (DVB-T) and Terrestrial – Digital Audio Broadcasting (T-DAB) allotment planning*, Electronic Communications Committee (ECC) within the European Conference of Postal and telecommunications Administrations (CEPT), ECC Report 49, Copenhagen, April 2004, Page 6.

[2] *Technical criteria of Digital Video Broadcasting Terrestrial (DVB-T) and Terrestrial – Digital Audio Broadcasting (T-DAB) allotment planning*, Electronic Communications Committee (ECC) within the European Conference of Postal and telecommunications Administrations (CEPT), ECC Report 49, Copenhagen, April 2004, Page 14.

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3 Single Frequency Network Optimization

Given the single frequency networks limitations, the SFN size optimization and the need to balance spectrum efficiency with self interference is vital. Whilst a larger SFN provides a higher spectrum efficiency it is also more prone to self-interference. The Institute für Rundfunktechnik analysis of the optimal SFN size for spectrum efficiency without self-interference is depicted in Figure. It shows that SFNs using 64QAM 2/3 FEC are typically limited to a service diameter of 100 to 150 km in order to restrict self-interference within the network.

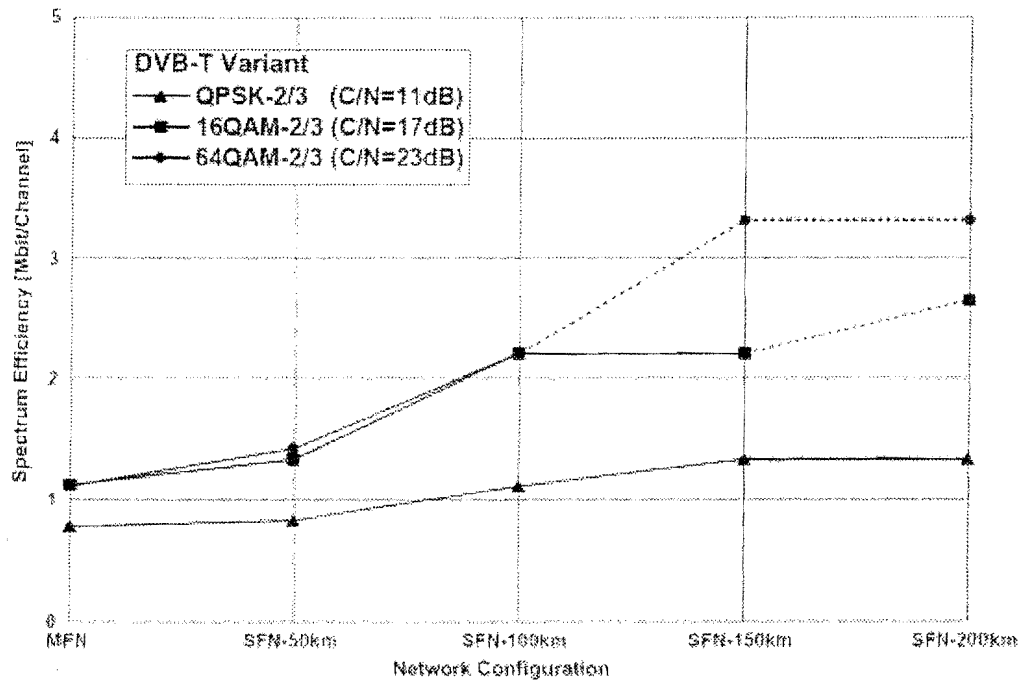

Figure.2: Spectrum efficiency of three DVB-T system variants shown in terms of possible SFN sizes (dotted lines indicate SFN sizes not considered realisable due to self-interference)[3]

Chapter 3 to Annex 2 of the Final Acts of RRC-06 defines reference networks to cover the different implementation requirements for DVB-T networks. Reference Network 1 (RN 1) is indented for **large** service area SFN coverage. RN 1 assumes that main transmitter sites with an appropriate effective antenna height are used as a backbone for this type of network.

[3] *Digitales Terrestrisches Fernseh: Einführungs-und Umstiegszenarien*, Dr Gerd Bock, Institute für Rundfunktechnik (IRT), parper presented to the FKTG - Fernseh- und Kinotechnische Gesellschaft at theTechnical University of Imenau, Germany, June 2000

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"For portable and mobile reception, ***the size of the real service areas for this type of SFN coverage is restricted to 150 to 200 km in diameter because of self-interference degradation****, unless very rugged DVB-T system variants are used or the concept of dense networks is employed"*[4] (emphasis added). Fixed reception may be aided by the directivity of a receive antenna and extend slightly beyond these limits.

The large service area parameters prescribed and agreed to at RRC-06 are listed in Table A.3.6-1 of Annex 3.6 to Chapter 3. The table is reproduced below for easier reference.

TABLE A.3.6-1

Parameters of RN 1 (large service area SFN)

RPC and reception type		RPC 1 Fixed antenna	RPC 2 Portable outdoor and mobile	RPC 3 Portable indoor
Type of network		Open	Open	Open
Geometry of service area		Hexagon	Hexagon	Hexagon
Number of transmitters		7	7	7
Geometry of transmitter lattice		Hexagon	Hexagon	Hexagon
Distance between transmitters d (km)		70	50	40
Service area diameter D (km)		161	115	92
Tx effective antenna height (m)		150	150	150
Tx antenna pattern		Non-directional	Non-directional	Non-directional
e.r.p.* (dBW)	Band III	34.1	36.2	40.0
	Bands IV/V	42.8	49.7	52.4

The e.r.p. is given for 200 MHz in Band III and 650 MHz in Bands IV/V; for other frequencies (f in MHz) the frequency correction factor to be added is: 20 $\log_{10}$ (f/200 or f/650) for RPC 1 and 30 $\log_{10}$ (f/200 or f/650) for RPC 2 and RPC 3.

* The e.r.p. values indicated in this table incorporate an additional power margin of 3 dB.

[4] Annex 2 Chapter 3 of the Final Acts of the ITU Regional Radiocommunication Conference for planning of the digital terrestrial broadcasting service in parts of Regions 1 and 3, in the frequency bands 174-230 MHz and 470-862 MHz (RRC-06), page 205

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3. Protection ratio for Co-channel PAL-I analogue television being interfered with PAL-I analogue television

TABLE 3.II – *Protection ratio*

Offset in multiples of 1/12 line-frequency		0	1	2	3	4	5	6	7	8	9	10	11	12
Non precision offset	Tropospheric interference	45	41	40	34	30	28	27	28	30	34	40	44	45
(Transmitter stability ± 500 Hz)	Continuous interference	52	51	48	44	40	36	33	36	40	44	48	51	52

(Value in the first column is only valid for 0/12 case. All other values between 1/12 and 12/12 are the same by addition or subtraction of integer multiples of 12/12 up to ± 36/12.)

4. Co-channel protection (PAL-I Interfered with DVB-T)

TABLE A.3.3-23

Co-channel protection ratios (dB) for a analogue terrestrial television signal interfered with by co-channel DVB-T signal

	Tropospheric interference	Continuous interference
DVB-T 8 MHz (UHF)	34	40
DVB-T 7 MHz (VHF)	35	41

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5. Co-channel protection (DVB-T Interfered with DVB-T)

TABLE A.3.3-1

Co-channel protection ratios (dB) for a DVB-T signal interfered with by a DVB-T signal for different DVB-T variants for the case of fixed reception (FX), portable outdoor reception (PO), portable indoor reception (PI) and mobile reception (MO)

DVB-T system variant	FX	PO	PI	MO
QPSK 1/2	6.00	8.00	8.00	11.00
QPSK 2/3	8.00	11.00	11.00	14.00
QPSK 3/4	9.30	11.70	11.70	14.70
QPSK 5/6	10.50	13.00	13.00	16.00
QPSK 7/8	11.50	14.10	14.10	17.10
16-QAM 1/2	11.00	13.00	13.00	16.00
16-QAM 2/3	14.00	16.00	16.00	19.00
16-QAM 3/4	15.00	18.00	18.00	21.00
16-QAM 5/6	16.90	19.40	19.40	22.40
16-QAM 7/8	17.50	20.10	20.10	23.10
64-QAM 1/2	17.00	19.00	19.00	22.00
64-QAM 2/3	20.00	23.00	23.00	26.00
64-QAM 3/4	21.00	25.00	25.00	28.00
64-QAM 5/6	23.30	25.80	25.80	28.80
64-QAM 7/8	24.30	26.90	26.90	29.90

6. Protection ratio for lower adjacent channel interference (PAL-I interfered with PAL-I)

TABLE 3.III – *Protection ratio for lower adjacent-channel interference (UHF bands)*

Wanted signal \ Unwanted signal	Protection ratio (dB)			
	G	H	I	K1
G	– 9	– 9	– 9	– 9
H	– 9	– 9	– 9	+ 13
I	– 9	– 9	– 9	+ 13
K1	– 9	– 9	– 9	– 9

7. Protection ratio for upper adjacent channel interference (PAL-I interfered with PAL-I)

GE89 qualifies that the protection ratio for upper adjacent channel interference for all analogue TV systems is -12 dB.

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8. Protection ratio for lower- and upper adjacent channel interference (PAL-I interfered with DVB-T)

TABLE A.3.3-25

Protection ratios (dB) for analogue B, D, D1, G, H, K/PAL vision signals interfered with by a DVB-T 8 MHz signal (overlapping channels)

Centre frequency of the unwanted DVB-T signal minus the vision carrier frequency of the wanted analogue television signal (MHz)		Protection ratio	
		Tropospheric interference[1]	Continuous interference[1]
	−8.25	−16	−11
(*N* − 1)	−5.25	−9	−5
	−4.75	−4	3
	−4.25	12	20
	−3.75	24	30
	−3.25	29	36
	−2.25	33	39
	−1.25	34	40
(*N*)	2.75	34	40
	4.75	34	39
	5.75	30	37
	6.75	27	34
	7.75	25	32
	8.75	5	11
(*N* + 1)	9.75	−8	−5
	12.75	−8	−5

[1] The values for tropospheric and continuous interference have been arrived at from Table A.3.3-24 by calculation.

9. Protection ratio for lower- and upper adjacent channel interference (PAL-I interfered with DVB-T)

TABLE A.3.3-2

Protection ratios (dB) for a DVB-T signal interfered with by a DVB-T signal in the lower (*N*− 1) and upper (*N*+ 1) adjacent channels

Channel	*N*− 1	*N*+ 1
PR	−30	−30