

Technical overview of the DVB-T2 switchover planning

cases studies

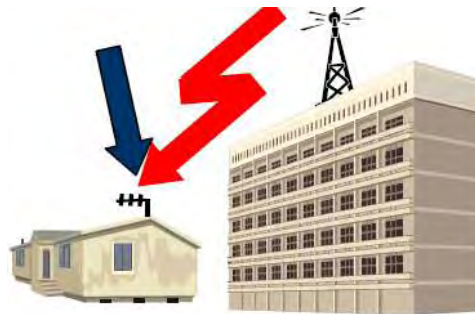


Digital Broadcasting
Switchover Forum
Johannesburg, South Africa
11.02.2013

Introduction

Feedback on the previous presentation

The coexistence LTE \Leftrightarrow DVB-T



Digital switchover process

The switchover strategy is not only a technical topic, but has to be included in a global approach with a clear government politics and a strategic study:

- Definition of the digital network objectives
- Status of the existing network
- Digital network calculation

Part 1 – Digital switchover in Turkey : project management



Part 2 – Compatibility DTT vs LTE : Ofcom methodology



Part 1 – Digital switchover in Turkey

Context of the project

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graph TD; A[Context of the project] --> B[Project preparation]; B --> C[Milestone]; C --> D[Conclusions];
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Project preparation

Milestone

Conclusions

Context of the project

Country size: 783 562 sq Km

Population: 76 Millions Hab

Density of Population

Relief of Turkey

Neighbour countries



End Customer: RTUK (Turkish Broadcast Regulator)

Existing analog networks

DTT planification and FM network study

Coverage Optimization and Spectrum Optimization

Project duration: 1 year

Project preparation (1/2)

Digital network calculation - hypothesis

- Is the technology chosen (DVB-T, DVB-T2, ISDB-T,..)?
- Number of channels/multiplex chosen?
- Which percentage of population has to be covered?
- Which rules used to plan a new station and switch off the old one?
- Maximal number of new stations / budget allowed?
- Position of the reception antenna (outdoor 10m, indoor)?
- Propagation model chosen by ATDI validated.
- Network SFN or MFN?



Considering that each choice has a big impact on the number of new stations to be deployed, it is necessary to give some flexibility for some criterion.

Project preparation (2/2)

- Project start (Roles definition, project plan validation)
- Examination of the RRC-06 agreements
- Examination of the Terrestrial Digital TV Broadcasting technologies
- Data collection (delivery of the digital cartography)
- Definition of the planning criterion

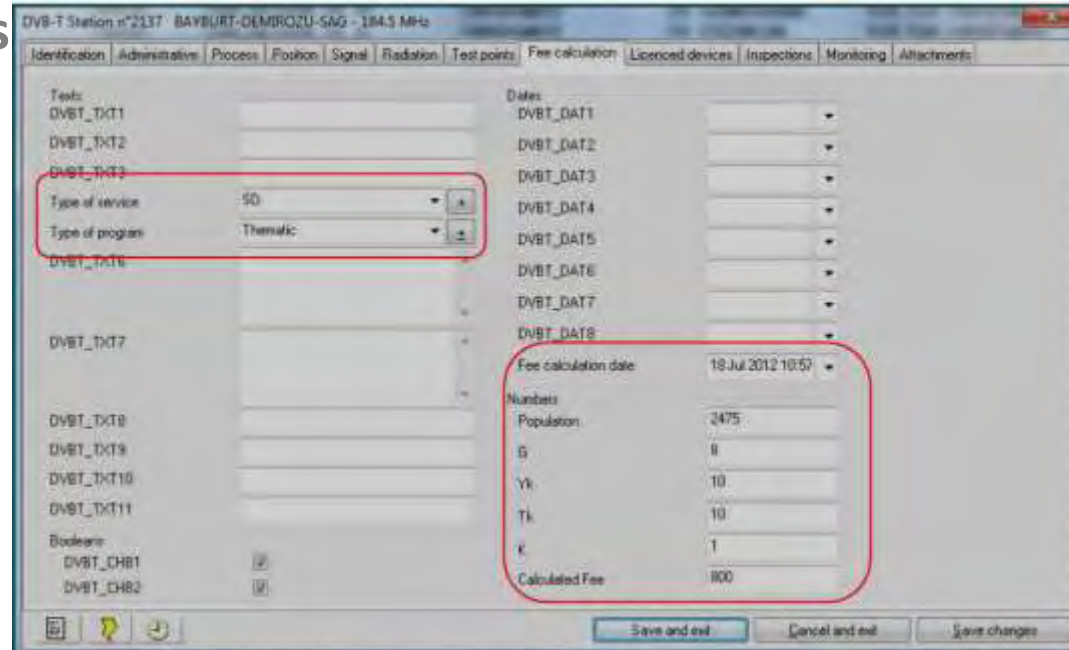
Milestone (1/3)

- Measurement campaign
- Propagation model tuning
- Coverage calculation and population analysis
- Multiplex defined by the RTUK
- Channel assignment (Constraints of coordinations with other countries)
- MFN + SFN interference calculation (batch in ICS telecom / BDD mode)
- Final population analysis and Optimization (% of population with coverage and without interferences)



Milestone (2/3)

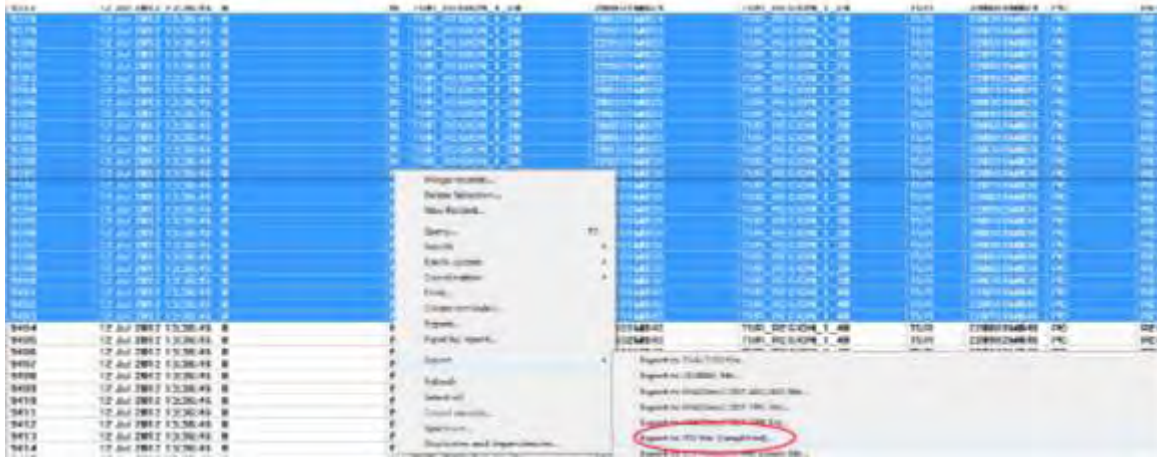
- Training for the use of ATDI tools
- Integration of the final DTV frequency plan into the Spectrum Management tool : ICS manager
- License fees calculation customized for the project




ID	Name of input parameter	Type of values (VaiType)	Description
1	ERP	dBW	RTUK Effective radiated power
2	Frequency	F/MHz	Fréquence de l'assignation en MHz
3	Population	Number	RTUK Covered population
4	Province	low_PROVINCES	RTUK Province
10	TypeOfService	low_DVB_T_TXT4	RTUK Type of service
11	TypeOfProgram	low_DVB_T_TXT5	RTUK Type of program

Milestone (3/3)

- Preparation of the transition plan (cohabitation period between the analog TV and the digital TV networks)
 - Decision to create a DTV transition plan
 - Alternative Analog TV frequency plan (analogical network modified in order to ease the switchover)
- GE06 conformity checking with ICS manager and ICS telecom
- Generation of the DVB-T2 notification files to the ITU



Channel	Frequency	Power	Modulation	Service	Country	Notes
0101	12.500000	100W	QAM-64	TV	FR	
0102	12.500000	100W	QAM-64	TV	FR	
0103	12.500000	100W	QAM-64	TV	FR	
0104	12.500000	100W	QAM-64	TV	FR	
0105	12.500000	100W	QAM-64	TV	FR	
0106	12.500000	100W	QAM-64	TV	FR	
0107	12.500000	100W	QAM-64	TV	FR	
0108	12.500000	100W	QAM-64	TV	FR	
0109	12.500000	100W	QAM-64	TV	FR	
0110	12.500000	100W	QAM-64	TV	FR	
0111	12.500000	100W	QAM-64	TV	FR	
0112	12.500000	100W	QAM-64	TV	FR	
0113	12.500000	100W	QAM-64	TV	FR	
0114	12.500000	100W	QAM-64	TV	FR	
0115	12.500000	100W	QAM-64	TV	FR	
0116	12.500000	100W	QAM-64	TV	FR	
0117	12.500000	100W	QAM-64	TV	FR	
0118	12.500000	100W	QAM-64	TV	FR	
0119	12.500000	100W	QAM-64	TV	FR	
0120	12.500000	100W	QAM-64	TV	FR	
0121	12.500000	100W	QAM-64	TV	FR	
0122	12.500000	100W	QAM-64	TV	FR	
0123	12.500000	100W	QAM-64	TV	FR	
0124	12.500000	100W	QAM-64	TV	FR	
0125	12.500000	100W	QAM-64	TV	FR	
0126	12.500000	100W	QAM-64	TV	FR	
0127	12.500000	100W	QAM-64	TV	FR	
0128	12.500000	100W	QAM-64	TV	FR	
0129	12.500000	100W	QAM-64	TV	FR	
0130	12.500000	100W	QAM-64	TV	FR	
0131	12.500000	100W	QAM-64	TV	FR	
0132	12.500000	100W	QAM-64	TV	FR	
0133	12.500000	100W	QAM-64	TV	FR	
0134	12.500000	100W	QAM-64	TV	FR	
0135	12.500000	100W	QAM-64	TV	FR	
0136	12.500000	100W	QAM-64	TV	FR	
0137	12.500000	100W	QAM-64	TV	FR	
0138	12.500000	100W	QAM-64	TV	FR	
0139	12.500000	100W	QAM-64	TV	FR	
0140	12.500000	100W	QAM-64	TV	FR	
0141	12.500000	100W	QAM-64	TV	FR	
0142	12.500000	100W	QAM-64	TV	FR	
0143	12.500000	100W	QAM-64	TV	FR	
0144	12.500000	100W	QAM-64	TV	FR	
0145	12.500000	100W	QAM-64	TV	FR	
0146	12.500000	100W	QAM-64	TV	FR	
0147	12.500000	100W	QAM-64	TV	FR	
0148	12.500000	100W	QAM-64	TV	FR	
0149	12.500000	100W	QAM-64	TV	FR	
0150	12.500000	100W	QAM-64	TV	FR	
0151	12.500000	100W	QAM-64	TV	FR	
0152	12.500000	100W	QAM-64	TV	FR	
0153	12.500000	100W	QAM-64	TV	FR	
0154	12.500000	100W	QAM-64	TV	FR	
0155	12.500000	100W	QAM-64	TV	FR	
0156	12.500000	100W	QAM-64	TV	FR	
0157	12.500000	100W	QAM-64	TV	FR	
0158	12.500000	100W	QAM-64	TV	FR	
0159	12.500000	100W	QAM-64	TV	FR	
0160	12.500000	100W	QAM-64	TV	FR	
0161	12.500000	100W	QAM-64	TV	FR	
0162	12.500000	100W	QAM-64	TV	FR	
0163	12.500000	100W	QAM-64	TV	FR	
0164	12.500000	100W	QAM-64	TV	FR	
0165	12.500000	100W	QAM-64	TV	FR	
0166	12.500000	100W	QAM-64	TV	FR	
0167	12.500000	100W	QAM-64	TV	FR	
0168	12.500000	100W	QAM-64	TV	FR	
0169	12.500000	100W	QAM-64	TV	FR	
0170	12.500000	100W	QAM-64	TV	FR	
0171	12.500000	100W	QAM-64	TV	FR	
0172	12.500000	100W	QAM-64	TV	FR	
0173	12.500000	100W	QAM-64	TV	FR	
0174	12.500000	100W	QAM-64	TV	FR	
0175	12.500000	100W	QAM-64	TV	FR	
0176	12.500000	100W	QAM-64	TV	FR	
0177	12.500000	100W	QAM-64	TV	FR	
0178	12.500000	100W	QAM-64	TV	FR	
0179	12.500000	100W	QAM-64	TV	FR	
0180	12.500000	100W	QAM-64	TV	FR	
0181	12.500000	100W	QAM-64	TV	FR	
0182	12.500000	100W	QAM-64	TV	FR	
0183	12.500000	100W	QAM-64	TV	FR	
0184	12.500000	100W	QAM-64	TV	FR	
0185	12.500000	100W	QAM-64	TV	FR	
0186	12.500000	100W	QAM-64	TV	FR	
0187	12.500000	100W	QAM-64	TV	FR	
0188	12.500000	100W	QAM-64	TV	FR	
0189	12.500000	100W	QAM-64	TV	FR	
0190	12.500000	100W	QAM-64	TV	FR	
0191	12.500000	100W	QAM-64	TV	FR	
0192	12.500000	100W	QAM-64	TV	FR	
0193	12.500000	100W	QAM-64	TV	FR	
0194	12.500000	100W	QAM-64	TV	FR	
0195	12.500000	100W	QAM-64	TV	FR	
0196	12.500000	100W	QAM-64	TV	FR	
0197	12.500000	100W	QAM-64	TV	FR	
0198	12.500000	100W	QAM-64	TV	FR	
0199	12.500000	100W	QAM-64	TV	FR	
0200	12.500000	100W	QAM-64	TV	FR	

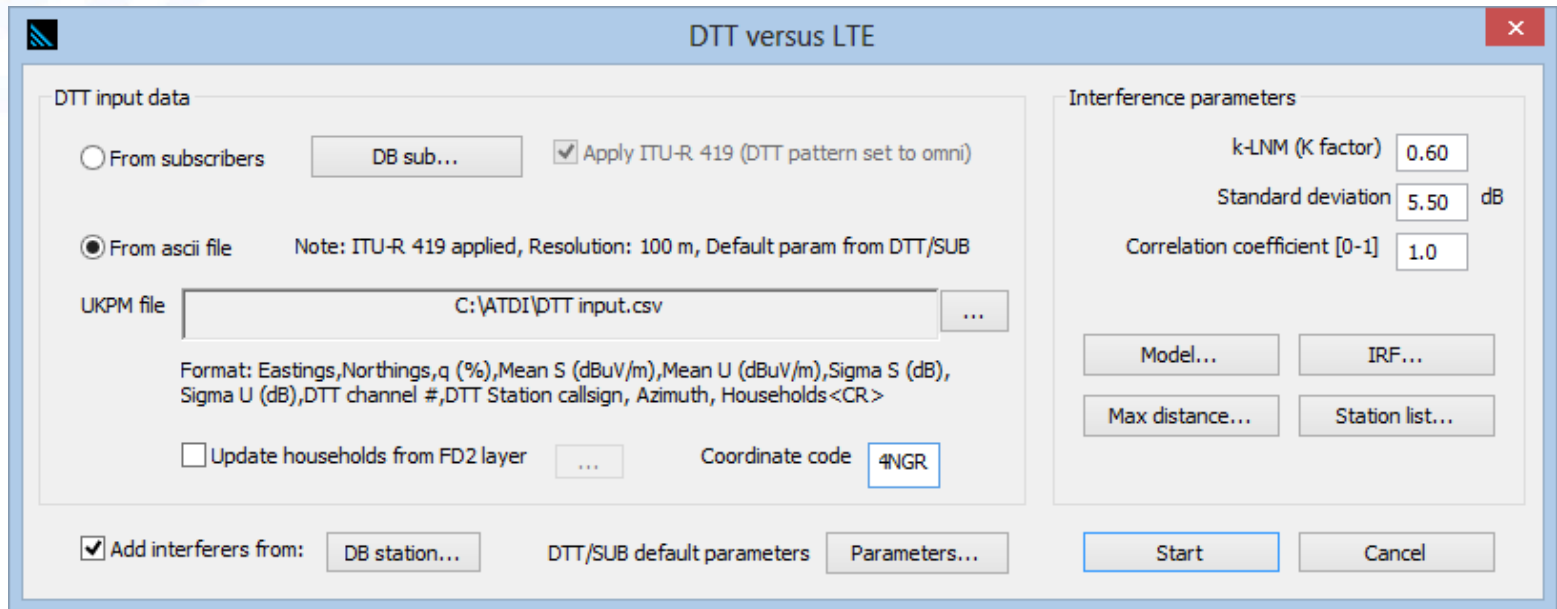
Part 2 – Compatibility DTT vs LTE: Ofcom methodology

Compatibility: existing functions in ICS telecom :

- Deterministic analysis
- Statistic analysis



Part 2 – Compatibility DTT vs LTE



DTT input data

From subscribers Apply ITU-R 419 (DTT pattern set to omni)

From ascii file Note: ITU-R 419 applied, Resolution: 100 m, Default param from DTT/SUB

UKPM file

Format: Eastings,Northings,q (%),Mean S (dBuV/m),Mean U (dBuV/m),Sigma S (dB),Sigma U (dB),DTT channel #,DTT Station callsign, Azimuth, Households<CR>

Update households from FD2 layer Coordinate code

Add interferers from: DTT/SUB default parameters

Interference parameters

k-LNM (K factor)

Standard deviation dB

Correlation coefficient [0-1]

New method provided by Ofcom (UK) :

Step 1 : Ofcom provides with a database with the % age of averaged service quality for each channel and each household

Part 2 – Compatibility DTT vs LTE

Step 2 : For each channel, calculation of :

- the interference level
- the contribution of each interferer (average and standard deviation)



Part 2 – Compatibility DTT vs LTE

Analysis :

- Household identification with more than 10% degradation in an area around the LTE station

Report listing

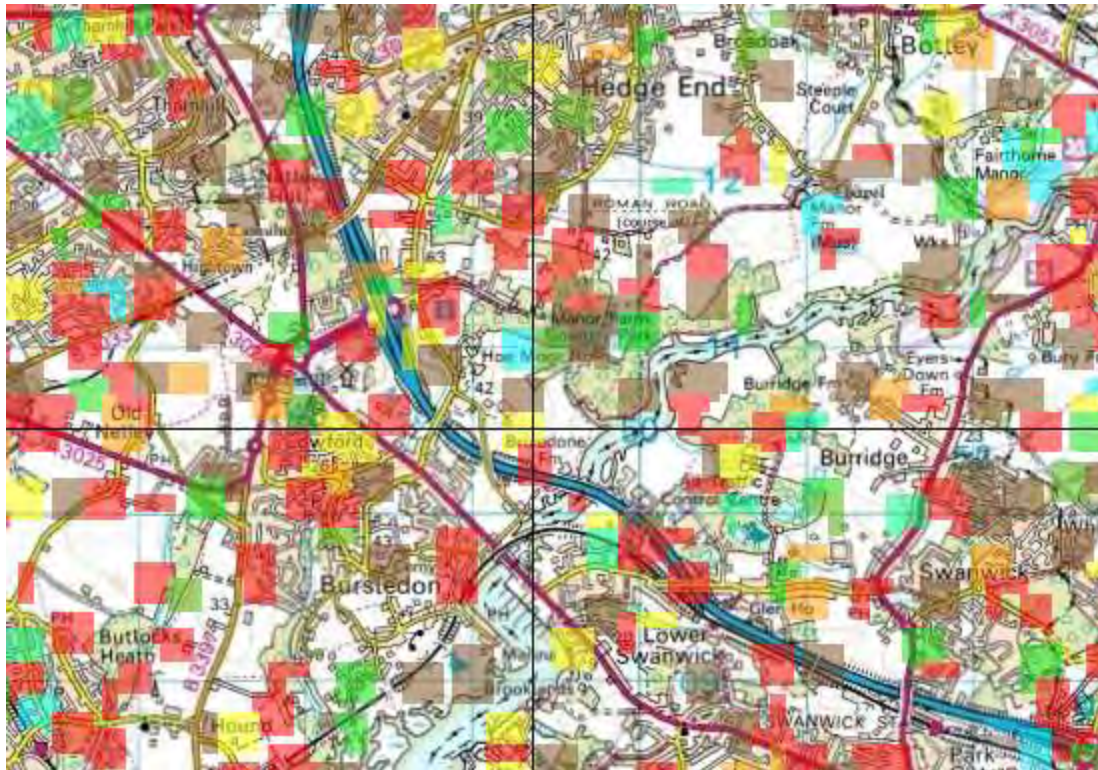
Record	Eastings	Northings	MeanS (dBu)	SigmaS (dB)	MeanU (dBu)	SigmaU (dB)	MeanV (dBu)	SigmaV (dB)	q (pc)	qp (pc)	DTT channel #	Frequency (MHz)	DTT ! ^
1	440300.0000	119800.0000	69.00	5.50	53.00	6.60	29.01	6.11	91.0000	91.0000	55	746.00000	DTT8
2	440900.0000	119800.0000	57.00	5.50	74.00	5.60	28.65	6.15	100.0...	0.0000	57	762.00000	DTT1
3	441100.0000	119800.0000	53.00	5.50	81.00	7.30	36.33	6.16	91.0000	0.0000	56	754.00000	DTT4
4	442200.0000	119800.0000	70.00	5.50	44.00	7.20	8.15	6.21	93.0000	93.0000	54	738.00000	DTT6
5	442300.0000	119800.0000	54.00	5.50	66.00	6.10	37.66	6.22	93.0000	0.0212	56	754.00000	DTT9
6	443000.0000	119800.0000	52.00	5.50	40.00	8.00	14.11	6.23	86.0000	86.0000	54	738.00000	DTT9
7	446200.0000	119800.0000	42.00	5.50	85.00	6.20	25.04	6.06	81.0000	0.0000	54	738.00000	DTT7
8	447000.0000	119800.0000	52.00	5.50	47.00	6.50	55.34	6.00	80.0000	12.4731	56	754.00000	DTT4
9	447500.0000	119800.0000	88.00	5.50	78.00	5.30	22.50	5.96	85.0000	85.0000	58	770.00000	DTT8
10	447800.0000	119800.0000	50.00	5.50	44.00	7.50	32.49	5.93	96.0000	94.4909	55	746.00000	DTT1
11	448400.0000	119800.0000	86.00	5.50	81.00	7.20	43.88	5.87	97.0000	91.9667	56	754.00000	DTT3
12	450100.0000	119800.0000	68.00	5.50	70.00	5.80	33.51	5.75	85.0000	27.5837	56	754.00000	DTT3
13	450300.0000	119800.0000	78.00	5.50	62.00	5.40	3.51	5.74	95.0000	95.0000	54	738.00000	DTT2
14	450400.0000	119800.0000	89.00	5.50	79.00	5.90	25.46	5.74	92.0000	92.0000	57	762.00000	DTT7
15	450600.0000	119800.0000	85.00	5.50	90.00	7.80	25.66	5.73	96.0000	8.5184	55	746.00000	DTT8
16	451200.0000	119800.0000	72.00	5.50	56.00	7.80	5.12	5.70	97.0000	97.0000	54	738.00000	DTT7
17	451800.0000	119800.0000	52.00	5.50	85.00	5.50	7.02	5.68	84.0000	0.0000	54	738.00000	DTT7
18	451900.0000	119800.0000	76.00	5.50	42.00	6.70	7.36	5.68	99.0000	99.0000	58	770.00000	DTT5
19	454500.0000	119800.0000	51.00	5.50	77.00	7.40	7.98	5.64	100.0...	0.0000	58	770.00000	DTT5
20	455700.0000	119800.0000	66.00	5.50	83.00	5.30	7.55	5.64	87.0000	0.0000	58	770.00000	DTT4
21	456000.0000	119800.0000	64.00	5.50	64.00	5.30	29.64	5.64	93.0000	49.9808	55	746.00000	DTT5
22	456400.0000	119800.0000	80.00	5.50	67.00	6.80	20.74	5.64	89.0000	89.0000	55	746.00000	DTT1
23	457400.0000	119800.0000	62.00	5.50	66.00	5.60	26.79	5.64	99.0000	11.4923	55	746.00000	DTT6
24	457700.0000	119800.0000	82.00	5.50	80.00	6.50	33.23	5.64	95.0000	71.8140	56	754.00000	DTT9
25	458700.0000	119800.0000	47.00	5.50	66.00	5.00	4.20	5.65	86.0000	0.0000	54	738.00000	DTT9
26	458800.0000	119800.0000	51.00	5.50	64.00	7.70	27.16	5.65	88.0000	0.0173	55	746.00000	DTT5

Listing... Close

Full process implemented in ICS telecom

Part 2 – Compatibility DTT vs LTE

Analysis : Household identification with more than 10% degradation



Filter provided by Ofcom for a better LTE signal rejection



A decorative graphic in the top-left corner consisting of several concentric, light blue circles of varying radii, creating a ripple effect.

Conclusion

Project management for a long term

Adaptability to the customer specificities

A large, faint, light blue circular logo is positioned in the top left corner of the slide. It features concentric, slightly irregular lines forming a circle.

Thank you for your attention!

For any question or feedback, please contact:

Laurent Novel

ATDI business development manager

lnovel@atdi.com

+33 1 53 30 89 48