

DTG Response to OFCOM for the consultation: Coexistence of new services in the 800 MHz band with digital terrestrial television

A primary objective of the Digital TV Group (DTG) is to enable the early introduction of new technology, while ensuring that coexistence issues with existing technologies are identified, understood and appropriately managed.

Ofcom must take time to commission and openly consider a comprehensive set of industry peer reviewed evidence across all platforms on which to base coexistence management decisions or risk overlooking critical evidence. Mitigation measures should be applied in a platform neutral, cross industry manner. The DTG is committed to doing everything within its power to assist Ofcom to establish adequate evidence based solutions in a timely manner.

We recommend that Ofcom takes into account the impact on all platforms, common in-home distribution systems, amplifiers and second and third digital terrestrial television (DTT) device reception/interference, mixed DTT, cable and digital satellite homes; and considers mechanisms to ensure adequate industry input and monitoring of MitCo.

Additionally we recommend that the impact on cable TV systems be considered/referenced. In many homes there is coexistence between cable and DTT for second/third sets and consideration should therefore be given to how these households are referenced by MitCo.

The additional tests we propose are detailed below:

LTE impact additional testing

The objective of these tests is to measure the impact of an LTE interferer range of domestic receiving infrastructure.

1) Setup

a) Signal sources

- i) Terrestrial feeds will be created using the DTG in-house stream players and modulators. A desired carrier will be setup using DVB-T parameters in Channel 60. Levels and operating parameters will be borrowed from the UK DTT network.

- ii) A second modulator will be setup to DVB-T2 on Channel 57 using PSB3 parameters.
- iii) Prior to introducing the LTE, levels will be confirmed as being within the UK network predicted received signal range at the point of inject to a DTT receiver.
- iv) The LTE interferer is be created using an Agilent Channel Simulator with the same setup as per previous DTG LTE tests for consistency.

b) Device under test (DUT): This will consist of a range of domestic antennas fitted with masthead amplifiers, baluns, and serving different bands depending on the scope of individual tests. The Ofcom filter will be fitted in each case to evaluate the impact of mitigation measures. Testing with two masthead amplifiers is proposed, with amplifiers selected by recommendation from the Confederation of Aerial Industries (CAI) to reflect the most widely deployed types in service. A full range of tests and progressive variations is provided in the attachments.

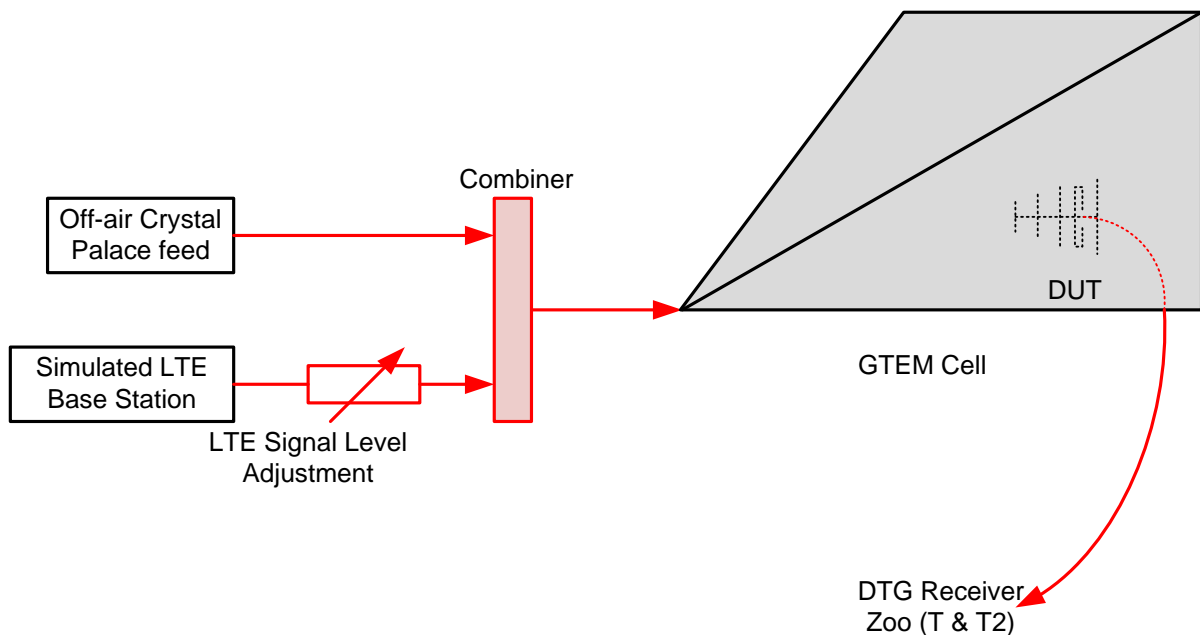


Fig.1 LTE Test Setup

c) Environment: The DUT will change throughout the test schedule, but the location and dressing of the feeder cable will be consistent for all tests. The feeder cable from the DUT will present an input to the DTG receiver Zoo. The Zoo contains DVB-T and T2 devices; Set top boxes and Integrated TVs. These will be observed for impact.

2) Scope: The measurements will initially concentrate on Channel 60 where the impact is expected to be most significant. These tests then consider other channels further from the LTE base station, finishing with Channel 52.

The following tables detail the test scenarios using various antenna types.

Test series 1.x measures the impact on Ch.60/59

- Different antenna groups
- Different antenna groups with balun fitted at dipole
- Wideband antenna with masthead amplifier: two widely installed units will be selected.
- Impact on Ch.59 for one case of each of the above

Test series 2.x are the same as 1.x but with the Ofcom Filter

- The tests are repeated but with the Ofcom mitigation measures in place.

Test series 3.x checks the impact on Ch.58/57 impact

- These tests are the same as Series 1.x, but examining the impact on channels further away from the LTE interferer: Ch.58 & 57

Test 4.x are the same as 3.x but with the Ofcom Filter fitted

- - These tests are the same as Series 1.x, but examining the impact on channels further away from the LTE interferer with the Ofcom mitigation measures in place: Ch.56 & 52 (Ch.52 was believed to have suffered an impact in previous tests)

Series 1

Test no.	Wanted Carrier	LTE	Signal to Rx	GTEM Cell	Rxs	
1	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group A, coax conn. Directly to dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.1	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.2	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

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1.3	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.4	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.5	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier X	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.6	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier Y	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.7	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.8	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
1.9	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

Series 2

Repeat tests with Ofcom LTE filter fitted, quantify impact.

Test no.	Wanted Carrier	LTE	Signal to Rx	GTEM Cell	Rxs

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2	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group A, coax conn. Directly to dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.1	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.2	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.3	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.4	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.5	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier X	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.6	Setup	Ch.60	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier Y	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.7	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
2.8	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

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2.9	Setup	Ch.59	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

Series 3

Test no.	Setup	Wanted Carrier Channel	LTE	Signal to Rx	GTEM Cell	Rxs
3	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group A, coax conn. Directly to dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.1	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.2	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.3	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.4	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.5	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier X	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

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3.6	Setup	58	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier Y	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.7	Setup	57	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.8	Setup	57	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
3.9	Setup	57	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

Series 4

Repeat tests with Ofcom LTE filter fitted, quantify impact.

Test no.	Wanted Carrier	LTE	Signal to Rx	GTEM Cell	Rxs	
4	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group A, coax conn. Directly to dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.1	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.2	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				

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4.3	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.4	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.5	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier X	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.6	Setup	56	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna with masthead amplifier Y	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.7	Setup	52	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.8	Setup	52	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Wideband	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				
4.9	Setup	52	Simulated BS Source, 1MHz guard band	Combined Output	Domestic Antenna; Group C/D with Balun at dipole.	Zoo
	Method	: Increase LTE signal slowly, observe receiver behaviour				