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Network Ready-Approved Module Testing Scope

Network Ready Test Cases

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Revision History

Date	Revision	Description
12/9/2014	1.0	Finalized this document from DRAFT version and made minor changes
4/7/2015	2.0	Updated the document to remove NR-AM-DO tests which are in 10776 now and added TCU/OCU tests as a Connected Car section
12/10/15	3.0	Changes to the document to remove not applicable tests for tablets, DV and PC devices and rewrite NR-AM-DO tests for MBA labs
3/31/16	3.1	Small updates and editorial changes
5/13/16	3.2	Addition of ODIS related test case and Cat 1 speed criteria
8/10/16	4.0	Introduction of NR-AM-DO test section 3 with AT&T Control Center test cases. Section 3 also now includes NR-AM-DV test cases. Added NR-AM-DV test cases in Section 2 for MBA labs to use Removed DV test cases from Section 4 and also removed DV tab. Removed N/A tests from Section 4 and also added APTN tests. Added several tests to Automotive in Section 5 including VOLTE and updated NR-AM-DV tests
12/5/16	4.1	Changes to allow for Chapter 3 to be the preferred process for NR-AM devices. Other editorial changes to support this. Changes in the Auto section (Chapter 5) to remove FRAT per NRL discussion
4/14/17	4.2	Simplified Chapter 3 with the new TRENDI Process and references. Removed any need for 911 testing for NR devices. Changed test cases for VOLTE testing.

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1. Introduction

1.1. Purpose

This document defines the scale of testing performed on Network Ready (NR) devices which incorporate an AT&T Approved Module (AM) entering the AT&T Network Ready Lab (NRL) or the Mobile Broadband Accelerator (MBA Labs). This NR testing leads to Technical Approval (TA) of the NR device that will operate on the AT&T wireless network. The purpose of the testing is to manage the quality of devices entering service on the AT&T wireless networks, to protect the quality of user experiences, and to minimize any negative impacts on the AT&T network.

1.2. Scope and Test results applicability

Network Ready devices encompass a broad range of capabilities: Voice and Data Smartphones, Laptops, Tablets, Home Alarm Panels, automotive Terminal Control Units, pallet tracking, Dog Collars, etc. The category of devices are referred to as NR-AM-DO (Network Ready Approved Module – Data Only) and NR-AM-DV (Network Ready Approved Module Data Voice).

This broad range of devices makes customizing the scope of NR testing necessary. The bands that the devices use to connect to the network such as UMTS, HSPA or LTE, also affect the scope of testing.

The test cases are divided based on devices category and type as listed below and please use this to determine which chapter to use for device testing.

NOTE: It is NOT necessary to provide results from more than any one section for a particular device for technical approval.

- Section 2 provides information on test cases for ALL NR-AM (NR-AM-DO and NR-AM-DV) devices which will be used by the Mobile Broadband Accelerator (MBA Labs). Please use this section for all NR-AM devices with the exception of laptops, tablets and connected car NR-AM-DO devices (in Chapter 5). Please note as noted above, that if Section 3 tests have been completed for a device, then this section is not required.
- Section 3 provides the outline for the “TRENDI” approach to testing NR-AM devices. TRENDI stands for “Technical Requirements for Evaluating Network ready Devices for IOT”. **This is our PREFERRED approach for testing applicable NR-AM devices**
- Section 4 provides the test case set for NR-AM-DO devices which are laptops (PCs), tablets.
- Section 5 provides the test cases for NR-AM-DO/NR-AM-DV Connected Car devices. This is only applicable to devices specified in that section and does not apply to NR-AM On Board Diagnostics II hotspot or telematics devices/

Please refer to the appropriate sections for your device type and category and if you have any questions, please reach out to your BPC or IOT project lead.

1.3. References

14782 Device Acceptance Process

10776 Lab and Field Test Requirements For Terminal Unit Acceptance

**TRENDI Test Requirements for Evaluating Network ready Devices for IOT
(available at www.att.com/iotdevices)**

AT&T Approved Modules

<http://www.att.com/modules>

2. Test Cases for Network Ready Approved Module Devices that are Data Only (NR-AM-DO) or Network Ready Approved Module Devices that are Data and Voice (NR-AM-DV)

The following are the test cases most commonly used with Network Ready (NR) devices which utilize an AT&T Approved Module (AM) and are either Data Only (DO) or Data and Voice (DV). This is the only set of tests required to be run by Mobile Broadband Accelerator (MBA labs) for testing any NR-AM devices.

The results of these tests, when run by MBA labs, can be put together in any document format noting the results along with any comments especially if a test is not applicable.

Some test cases may not be applicable to specific devices. Please review the tests with the OEM to verify how the tests can be conducted.

2.1. Version Verification

2.1.1. Verify Module Firmware and Hardware

Test Reference: NR-AM-DO-DV-1		Test Name: Version Verification	
Test Purpose/Description Verify module firmware version of the Device Under Test (DUT)			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: None			
Test Procedure:		Pass/Fail Criteria: In order to PASS:	Defect Severity:
1. Verify that the current firmware version of the integrated module in the device is the same as listed in the PTCRB approval		1. Verify it is the approved SW/HW version for the module. This module version should be on the OnBoarding Tool (OBT) as well and should match. If the version is correct, then it is a Pass or else a Fail	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: The Module Firmware is reported as EC25AFAR02A05M4G and the HW Version is reported as EC25	

2.1.2. Verify Device Firmware and Hardware

Test Reference: NR-AM-DO-DV-2		Test Name: Version Verification	
Test Purpose/Description Verify device firmware version of the Device Under Test (DUT)			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: None			
Test Procedure:		Pass/Fail Criteria: In order to PASS:	Defect Severity:
1. Verify that the current firmware version of the device is the same as listed in the PTCRB approval		1. Verify if the device SW/HW firmware version matches the version listed in PTCRB. This should also be listed correctly in the OnBoarding Tool as well. If the version is correct and matches, this is a Pass or else a Fail	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: The device Firmware is reported as V1.0.15 and the HW version is reported as V1.4	

2.1.3. ODIS Content Verification

Test Reference: NR-AM-DO-DV-3		Test Name: ODIS Content Verification
Test Purpose/Description Verify that Device Under Test (DUT) (NR-AM-DX) accurately reports Host device ODIS information during a device details report		
Defect Result: Pass/Fail/Not Applicable to the device (NA)		
Preconditions: Test case only applicable to devices with Radio Modules which support OMA DM IMEI Sync (ODIS). A factory bootstrap account is provisioned in the radio module. Device is populated with a pre-configured 310-170 SIM which has an internet facing APN provisioned. Tester must have a login and access to AT&T XDM platform.		
Test Procedure:	Pass/Fail Criteria: In order to PASS:	Defect Severity:
1. Login to AT&T XDM platform. 2. Configure the device with a factory bootstrap account on the server (Add a new device {+} Additional Information > Click "Yes" in Bootstrapped field) 3. Send a DM GET Check ALL to the device. 4. On server, look up the setting (./DevDetail/Ext/Host) value in the following location: Home> Advanced > DM Tree > Filter ./DevDetail/Ext 5. Record the following host device values are reported correctly: <ul style="list-style-type: none"> • ./DevDetail/Ext/HostMan • ./DevDetail/Ext/HostMod • ./DevDetail/Ext/HostSwV • ./DevDetail/Ext/HostPlasmaID • ./DevDetail/Ext/IMEISV 6. Take screen shot or otherwise record results.	2. Verify that response to DM GET Check ALL provides all ODIS nodes related to Host Device. 3. Verify each data element provided about the Host Device. Specifically, the reported values for Host Manufacturer, Host Device Model Number, Host Device SW Version, Host Device Plasma ID, Host Device IMEISV ALL must match data in OBT exactly. 4. Verify that the current firmware version of the integrated module in the device is the same as listed in the PTCRB approval.	
Result: <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> n/a		Comments: ODIS Option 3

2.2. Data Connectivity

2.2.1. Verify Data Connectivity and Ping Latency with an AT&T 310-410 SIM

Test Reference: NR-AM-DO-DV-4		Test Name: Data Connectivity
Test Purpose/Description Verify Data Connectivity to the AT&T network of the Device Under Test (DUT). Measure the Device Under Test's (DUT's) PING latency under stationary conditions in the AT&T network.		
Defect Result: Pass/Fail/Not Applicable to the device (NA)		
Preconditions: Verify that the device OEM provides a mechanism to connect to the data network and the appropriate SIMs are available. Verify that the device OEM provides a mechanism to connect to the data network and execute the PING command		
Test Procedure:	Pass/Fail Criteria: In order to PASS:	Defect Severity:
<ol style="list-style-type: none"> 1. Establish a Data connection using a AT&T 310-410 SIM by connecting it to the default APN (Broadband) or a Custom APN that is configured on the device. If a custom APN is used, then a SIM that matches that profile needs to be used. The exact method for data connection that is used depends on the device OEM's methods for establishing a data connection. As much as possible, the data connection should be done from the application or UI or other higher level layer that drives the module and not use AT commands. 2. Run the "PING" command 10 times using any method available (OEM to be consulted) to a reference IP address. 	<ol style="list-style-type: none"> 1. Verify that an active packet data connection is available on the device. This may be verified by checking if an IP address is assigned to the device and data can be sent (for example ping command). 2. The Ping Latency over the AT&T LTE network meets AT&T requirement in live network in specified conditions as mentioned in the table in Appendix A depending on LTE or 3G category. 3. The device is stable during the test with no reset, stall, freeze, etc. 4. If the device cannot run the PING test for technical reasons, then please mark this as N/A stating why it cannot be run. 	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: OUT does not provide tethered connectivity or any UI for PING testing. data connectivity verified through AT command

2.2.2. Verify Data Connectivity and Ping Latency with an AT&T 310-170 SIM

Test Reference: NR-AM-DO-DV-5		Test Name: Data Connectivity	
Test Purpose/Description Verify Data Connectivity to the AT&T network of the Device Under Test (DUT). Measure the Device Under Test’s (DUT’s) PING latency under stationary conditions in the AT&T network.			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: Verify that the device OEM provides a mechanism to connect to the data network and the appropriate SIMs are available. Verify that the device OEM provides a mechanism to connect to the data network and execute the PING command			
Test Procedure:		Pass/Fail Criteria: In order to PASS:	Defect Severity:
<div>1. If the device cannot run the PING test for technical reasons, then please mark this as N/A.</div> <div>2. If applicable to the device and if a 310-170 SIM is available configured with a Jasper APN, establish a Data connection using a AT&T 310-170 SIM by connecting it to the Custom APN or a default Jasper APN that is configured on the device. If a custom APN is used, then a SIM that matches that profile needs to be used. The exact method for data connection that is used depends on the device OEM’s methods for establishing a data connection. As much as possible, the data connection should be done from the application or UI or other higher level layer that drives the module and not use AT commands.</div> <div>3. Run the “PING” command 10 times using any method available (OEM to be consulted) to a reference IP address</div>		<div>1. Verify that an active packet data connection is available on the device. This may be verified by checking if an IP address is assigned to the device and data can be sent (for example ping command).</div> <div>2. The Ping Latency over the AT&T LTE network meets AT&T requirement in live network in specified conditions as mentioned in the table in Appendix A depending on LTE or 3G category.</div> <div>3. The device is stable during the test with no reset, stall, freeze, etc.</div> <div>4. If the device cannot run the test for technical reasons, then please mark this as N/A stating why it cannot be run.</div>	
Result: <div><input checked="" type="checkbox"/> Pass</div> <div><input type="checkbox"/> Fail</div> <div><input type="checkbox"/> n/a</div>		Comments: OUT does not provide tethered connectivity or any UI for PING testing. data connectivity verified through AT command	

2.2.3. 4G LTE or 3G FTP Throughput - Downlink, Stationary

Test Reference: NR-AM-DO-DV-6		Test Name: FTP Throughput – Downlink, Stationary	
Test Purpose/Description Measure the Device Under Test's (DUT's) FTP Throughput Downlink under stationary conditions in the AT&T network. Note: Use the highest speed technology in the device and compare against other known reference devices in the same environment			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: Verify that the device OEM provides a mechanism to connect to the data network. Please make sure the signal is strong (>-70dBm)			
Test Procedure:		Pass/Fail Criteria:	Defect Severity:
<ol style="list-style-type: none"> 1. If the device cannot run the test given the device interface, then please mark this as N/A and explain why. 2. Establish a Data connection using a AT&T 310-410 SIM by connecting it to the default APN (Broadband) or a Custom APN that is configured on the device. Use an off the shelf throughput test web site or location or any other server to test 3G or LTE FTP throughput and measure Downlink throughput. The test has to be run a minimum of 5 times to calculate the average. 3. Establish a Data connection using a AT&T 310-170 SIM by connecting it to the default APN (Broadband) or a Custom APN that is configured on the device. Use an off the shelf throughput test web site or location to test FTP throughput and measure Downlink throughput. The test has to be run a minimum of 5 times to calculate the average. 		In order to PASS: <ol style="list-style-type: none"> 1. The FTP Throughput for the DL over the AT&T LTE network meets AT&T requirement in live network in specified conditions as mentioned in the tables in Appendix A depending on LTE or 3G category. Please use the Average throughput for results and not any peak results. If both the reference and the device are failing, then please try again and if both still fail, please mark this as Blocked 2. The device is stable during the test with no reset, stall, freeze, etc. 3. If the device cannot run the test for technical reasons, then please mark this as N/A stating why it cannot be run. 	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: OUT does not provide tethered connectivity or any UI for PING testing. data connectivity verified through AT command The Device Transfers 96160 byte per day	

2.2.4. 4G LTE or 3G FTP Throughput - Uplink, Stationary

Test Reference: NR-AM-DO-DV-7		Test Name: FTP Throughput – Uplink, Stationary	
Test Purpose/Description Measure the Device Under Test's (DUT's) FTP Throughput Uplink under stationary conditions in the AT&T network. Note: Use the highest speed technology (example 4G LTE) in the device and compare against other known reference devices in the same environment			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: Verify that the device OEM provides a mechanism to connect to the data network Please make sure the signal is strong (>-70dBm)			
Test Procedure:		Pass/Fail Criteria:	Defect Severity:
<ol style="list-style-type: none"> 1. If the device cannot run the test given the device interface, then please mark this as N/A. 2. Establish a Data connection using a AT&T 310-410 SIM by connecting it to the default APN (Broadband) or a Custom APN that is configured on the device. Use an off the shelf throughput test web site or location or any other server to test 3G or LTE FTP throughput and measure Uplink throughput. The test has to be run a minimum of 5 times to calculate the average. 3. Establish a Data connection using a AT&T 310-410 SIM by connecting it to the default APN (Broadband) or a Custom APN that is configured on the device. Use an off the shelf throughput test web site or location to test FTP throughput and measure Uplink throughput. The test has to be run a minimum of 5 times to calculate the average. 		In order to PASS: <ol style="list-style-type: none"> 1. The FTP Throughput for the Uplink over the AT&T LTE network meets AT&T requirement in live network in specified conditions as mentioned in the tables in Appendix A depending on LTE or 3G category. Please use the Average throughput for results and not any peak results. If both the reference and the device are failing, then please try again and if both still fail, please mark this as Blocked 2. The device is stable during the test with no reset, stall, freeze, etc. 3. If the device cannot run the test for technical reasons, then please mark this as N/A stating why it cannot be run. 	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: OUT does not provide tethered connectivity or any UI for PING testing. data connectivity verified through AT command The Device Transfers 96160 byte per day	

2.2.5. Mobile Originated and Terminated SMS/MMS

Test Reference: NR-AM-DO-DV-8		Test Name: Mobile terminated and Mobile Originated SMS/MMS	
Test Purpose/Description Verify Mobile originated and Mobile Terminated SMS/MMS of the Device Under Test (DUT)			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: None			
Test Procedure:		Pass/Fail Criteria: In order to PASS:	Defect Severity:
<ol style="list-style-type: none"> 1. From idle state, use the DUT to compose and send a 160 character SMS and send it to another mobile number. Perform on the highest supported technology type (4G LTE or 3G). 2. If the device supports MMS, then SMS testing is NOT required and please send an MMS message of each type (text, >10 seconds of voice recording if possible, camera picture) from the DUT to another device. 3. If SMS was used, verify that the Device Under Test (DUT) can successfully receive and provide notification of an incoming 160 character SMS. Verify the timestamp on the received SMS is correct. 4. If MMS was used, please confirm the receipt of the MMS text, voice recording and picture on the terminating device. Please confirm the timestamp of the received MMS is correct. 		<ol style="list-style-type: none"> 1. Verify that the SMS was sent from the DUT and received on the target device with the correct timestamp 2. Verify that the SMS was received by the DUT and the timestamp is correct on the DUT 	
Result: <input checked="" type="checkbox"/> Pass <input type="checkbox"/> Fail <input type="checkbox"/> n/a		Comments: SMS successfully was sent and received by the device in a correct timing	

2.3. 911 testing

As of release 4.2, AT&T does not need to review the results of 911 testing of NR-AM-DV devices. However it is strongly suggested that OEMs work with Spirent to conduct “**IOT 911 two market SIM/No SIM tests**”

2.4. Data and voice testing

2.4.1. Voice call testing during data activity

Test Reference: NR-AM-DV-ONLY-1		Test Name: Voice call testing during data browsing	
Test Purpose/Description Verify the ability of the device (if capable) to make voice calls while in a data session.			
Defect Result: Pass/Fail/Not Applicable to the device (NA)			
Preconditions: None			
Test Procedure:		Pass/Fail Criteria:	Defect Severity:
<ol style="list-style-type: none">1. Ensure that the device is operational on AT&T's network.2. If the device is data capable, start a data session where the device is using data actively – for example, downloading or uploading a file or other data activity. While this is in progress, make a voice call from the device or receive a voice call.		<p>In order to PASS:</p> <ol style="list-style-type: none">1. The device should be able to make or receive a voice call while using data.2. If the voice call cannot be originated or terminated in repeated attempts (at least 3), please Fail this test.	
Result: <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> n/a		Comments: The Final Device is Data Only	

2.4.2. Voice call continuity test

Test Reference: NR-AM-DV-ONLY-2	Test Name: Voice call continuity while driving
Test Purpose/Description Verify the ability of the device to make a voice call and continue with the voice call while driving between cell sites.	

Defect Result: Pass/Fail/Not Applicable to the device (NA)		
Preconditions: The device needs to be registered to AT&T Network.		
Test Procedure:	Pass/Fail Criteria: In order to PASS:	Defect Severity:
<ol style="list-style-type: none"> 1. Power up the device and the device should be registered on AT&T network. 2. Start a data session on the device under test (maybe a ping session or download/upload) and while this is ongoing, either make a call or receive a call on the DUT. 3. Drive while the call is still active on the device in a known area where there is a cell site change and make sure the call is still ongoing without drops. 4. It is left to the discretion of the test lab to determine the route to take based on past experience or AT&T can provide cell information through BPC if needed. 5. Please note that this test may be combined with test NR-AM-DV-ONLY-1 if required. 	<ol style="list-style-type: none"> 1. The device should continue with the data session while the call is ongoing. A known reference device may also be used to verify the behavior of the DUT is the same as the reference device in maintaining the call 2. If the DUT shows consistent call drop, then this should marked as a Fail. 3. If this test cannot be conducted due to DUT limitations (no keypad etc.), please notate it as such in the report. 	
Result: <input type="checkbox"/> Pass <input type="checkbox"/> Fail <input checked="" type="checkbox"/> n/a	Comments: The Final Device is Data Only	

3. Test Requirements for Evaluating Network ready Devices for IOT (TRENDI) Process for NR-AM devices Using AT&T Control Center

AT&T's preferred mode of testing is the approach in the "Test Requirements for Evaluating Network Ready Devices for IOT (TRENDI)". OEMs may choose to run the test cases themselves and provide a test report extracted from AT&T Control Center utilizing screenshots embedded within the format found at the end of the TRENDI document, or if they choose, may schedule for coordination of results gathering to be performed by AT&T personnel.

For more information about the "TRENDI" process, please visit the website www.att.com/iotdevices.

4. Network Ready Device test cases for tablets, laptops

The following are the test cases most commonly used with Network Ready devices that are tablets or PCs (except NR-AM-DX Connected Cars which is listed in Section 5).

The list below shows the Requirement Number, as found in the AT&T document 10776, the Test Description, and the Purpose of Test. The list also shows if the test is applicable for Data Only Personal Computers, or Data Only Tablets as noted below.

AT&T Test Requirement Number Test Description Purpose of Test

Please use the check mark below against each device type below:

PC For Personal Computer devices

TAB For Tablet devices

10776 test case Number	Applicability		Summary	Comments
	PCs	TAB		
GSM-BTR-1-1702		X	Device behavior upon receiving GPRS Attach / RAU Reject using GMM #17 - Network Failure - 3G UE	Test verifies that the 3G device follows the CDR-NWS-038 requirement by not aggressively trying to re-attach back on the PS domain or reselect to 2G after it receives a Temporary PS PLMN restriction from the 3G network
GSM-BTR-1-1706		X	Device behavior upon receiving PDP ACTIVATE CONTEXT REJECT using Cause #33 -Requested Option Not Subscribed - 3G UE	Test verifies that the 3G device does not aggressively try to re-activate the PDP Context after it receives a PDP Context Reject using Cause #33 from the 3G network
GSM-BTR-1-1708		X	Device Behavior upon Ignored RRC Connection Request during CS/PS Registration - 3GUE	Test verifies that the 3G device does not aggressively try to reattempt the RRC Connection during a CS/PS registration procedure if the request is ignored by the network
GSM-BTR-1-1726		X	Device Behavior upon Ignored GPRSAttach/RAU - 3GUE	Test verifies that the 3G device does not aggressively try to reattempt the Attach/RAU procedure if the request is ignored by the network
GSM-BTR-1-1728		X	Device Behavior upon Ignored Activate PDP Context - 3GUE	Test verifies that the 3G device does not aggressively try to reattempt the Activate PDP context procedure if the request is ignored by the network
GSM-BTR-1-1730		X	Device Behavior upon Ignored LAU - 3G UE	Test verifies that the 3G device does not aggressively try to reattempt the Location update procedure if the request is ignored by the network
LTE-BTR-1-1802		X	Device behavior upon receiving EMM Attach Reject with ESM Cause on EUTRAN	Test verifies that a EUTRA capable device does not aggressively re-attempt attach requests on EUTRAN when an EMM ATTACH fails with ESM cause.

LTE-BTR-1-1804		X	Device behavior during ALU MME Overload - EMM CM SERVICE REQUEST IGNORE / REJECT #22, ATTACH/TAU REJECT #22, UTRAN available	Test verifies that a EUTRA capable device does not aggressively re-attempt Service/TAU/Attach requests on EUTRA during an ALU MME overload scenario where all NAS procedures are rejected with cause #22 - Congestion.
LTE-BTR-1-1806		X	Device behavior during E// MME Overload - EMM CM SERVICE REQUEST IGNORE / REJECT #22, ATTACH/TAU REJECT IGNORE, UTRAN available	Test verifies that a EUTRA capable device does not aggressively re-attempt Service/TAU/Attach requests on EUTRA during an E// MME overload scenario where all NAS procedures are ignored. Service on UTRA is available
LTE-BTR-1-1808		X	Device behavior upon receiving mixed EMM Attach and TAU Rejects	Test verifies that a EUTRA capable device does not aggressively re-attempt ATTACH/TAU requests on EUTRA when ATTACH and TAU Requests are rejected with a combination of reject codes. Service on UTRA is available
LTE-BTR-1-1812		X	Data-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 17 - Network Failure on EUTRAN	Test verifies that a EUTRA capable device does not aggressively re-attempt attach requests on EUTRA when an EMM ATTACH is ACCEPTED but with an embedded EMM cause code #17 - Network Failure. Service on UTRA is available
LTE-BTR-1-1816		X	Data-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 34 - Service option temporarily out of order on EUTRAN on EUTRAN	Test verifies that a EUTRA capable device does not aggressively re-attempt attach requests on EUTRA when an EMM ATTACH is ACCEPTED but with an embedded EMM cause code #34 - Service option temporarily out of order on EUTRAN. Service on UTRA is available
LTE-BTR-1-1820		X	Device behavior when both E-UTRAN and UTRAN are overloaded: E-UTRAN - EMM IGNORE / REJECT #22, UTRAN - CS domain available (Location Update OK); PS domain overloaded (ATTACH/RAU Ignore)	Test verifies that an E-UTRA capable device does not aggressively re-attempt requests on EUTRAN and UTRAN when both networks are overloaded
LTE-BTR-1-1824		X	Device behavior when both E-UTRAN and UTRAN are overloaded: E-UTRAN - EMM IGNORE / REJECT #22, UTRA - CS domain overloaded (LU rejected with cause #22); PS domain overloaded (ATTACH/RAU rejected with cause #17)	Test verifies that an EUTRA capable device does not aggressively re-attempt requests on EUTRAN and UTRAN when both EUTRA and UTRA networks are overloaded
LTE-BTR-1-1826		X	Device behavior when both E-UTRAN and UTRAN are abnormal: E-UTRAN - EMM REJECT #111, UTRAN - CS domain overloaded (LU Ignore); PS domain normal	Test verifies that a EUTRA capable device does not aggressively re-attempt requests on EUTRAN and UTRAN when both networks are abnormal
LTE-BTR-1-1830		X	Device behavior when RRC Connection Requests are repeatedly rejected on E-UTRAN at power up	Test verifies that a EUTRA capable device does not aggressively re-attempt RRC Connection Requests on the same E-UTRAN cell when RRC

				Connection Requests are repeatedly rejected at power up
LTE-BTR-1-1836		X	Device behavior when RRC Connection Requests are repeatedly ignored on E-UTRAN at power up	Test verifies that a EUTRA capable device does not aggressively re-attempt RRC Connection Requests on the same E-UTRAN cell when RRC Connection Requests are repeatedly ignored at power up
LTE-BTR-1-1838		X	Device behavior when RRC Connection Requests, which are trigger by CM Service Request, are repeatedly rejected on E-UTRAN	Test verifies that a EUTRA capable device does not aggressively re-attempt RRC Connection Requests on the same E-UTRAN cell when RRC Connection Requests, which are trigger by CM Service Request, are repeatedly rejected
GSM-BTR-1-2402		X	Dormant Mode	With the DUT's services active, the test measures the number of RRC connections from and to the DUT over the test period.
GSM-BTR-1-9815		X	Activation OTA updates while on the live network	Verify activation OTA updates while on the live network
LTE-BTR-1-0001		X	UMTS Maximum Power Reduction (MPR)	Measure and document the UE's maximum output power reduction when UE is in maximum output power as Specified in test document 14680
LTE-BTR-1-0038		X	LTE Maximum Power Reduction (MPR)	Measure and document the UE's maximum output power reduction when UE is in maximum output power as specified in 3GPP TS 36.521-1 Section 6.2.2.3
LTE-BTR-1-7552		X	Verify Soak Operation: Signed-In	Verify the device/email client is not sending packets during nominal idle times in a browser session, based on user signing-in to some designated features.
GSM-FLD-2-6790		X	Tethering Entitlement - Initial Authorization	Verify that the TU checks for entitlement before enabling tethering service.
GSM-FLD-2-8000	X	X	Power Up Registration	Power up device and verify the modem registers and attaches to the network.
GSM-FLD-2-8002	X	X	Check Current Firmware Version	Verify the device will display the current firmware version that is on the integrated module and verify it is the current approved version.
GSM-FLD-2-8004	X	X	Check Current Connection Manager Version	Verify the device is using the correct and current modem manager.
GSM-FLD-2-8006	X	X	Data Connection/Disconnection	Perform 5 data connections and disconnections verifying that data can be passed after each new connection. Perform the new connection immediately after the previous disconnection is completed.
GSM-FLD-2-8008	X	X	Suspend/Resume	Verify the device will properly resume and reconnect a data session after being put into suspend. Perform 3 times
GSM-FLD-2-8010	X	X	Hibernation	Put the system into hibernation and verify that upon coming out of

				hibernation the device will connect and pass data. Perform 3 times.
GSM-FLD-2-8016	X	X	Drive Test	Establish a data session and perform continuous http or ftp downloads through multiple cell handoffs and through a routing area boundary.
NR-AM-DO-DV-6	X	X	Downlink LTE FTP (or 3G FTP) throughput test:	Establish a data session and perform Downlink FTP throughput test as outlined in NR-AM-DO-DV-6 in Section 2 of this document.
NR-AM-DO-DV-7	X	X	Uplink LTE FTP (or 3G FTP) throughput test:	Establish a data session and perform Uplink FTP throughput test as outlined in NR-AM-DO-DV-6 in Section 2 of this document.
SPE Document 19833		X	Application Protect The Network tests for Network Ready devices	This document specifies protect-the-network test cases for protocol layers 4-7. The goal is to identify device and/or application behavior that may either cause harm to the network or cause the network to operate sub-optimally.

5. NR-AM-DO/NR-AM-DV Test Cases for Connected Car Devices.

The following are the test cases used with NR-AM-DO/DV Connected Cars devices if applicable during AT&T certification. In addition to test cases listed below, Jasper Wireless Device Certification may be needed.

It is also required that the partner work closely with the BPC to complete Jasper Device Certification testing, review of Automotive Implementation Guide (AIG) and also Vehicular Antenna Performance Guide (Document 19877) prior to Lab Entry.

The test cases below will be executed as applicable in the Network Ready Lab (NRL) at Lab Entry and cover the following test areas:

- SIM OTA
- Signaling Impact Analysis
- Device Aggression Management
- Global SIM (if applicable)
- Fast Return to AT&T (FRAT), (if applicable)
- VOLTE test cases as applicable
 - o A86 IMS VoLTE
 - o A72 IMS VoLTE Border
 - o A95 IMS VoLTE Ut Interface

5.1. NR-AM-DO/NR-AM-DV Connected car test cases that may be executed:

Test: Section	Test: Test Number	Test Summary
R25. SIM OTA	GSM-BTR-1-9815	[1]Activation OTA updates while on the live network
R36. Device Aggression Management	GSM-BTR-1-1700	[1]Device behavior upon receiving GPRS Attach RAU Reject using GMM #17 - Network Failure - 2G UE
R36. Device Aggression Management	GSM-BTR-1-1702	[1]Device behavior upon receiving GPRS Attach RAU Reject using GMM #17 - Network Failure - 3G UE
R36. Device Aggression Management	GSM-BTR-1-1704	[1]Device behavior upon receiving PDP ACTIVATE CONTEXT REJECT using Cause #33 -Requested Option Not Subscribed - 2G UE
R36. Device Aggression Management	GSM-BTR-1-1706	[1]Device behavior upon receiving PDP ACTIVATE CONTEXT REJECT using Cause #33 -Requested Option Not Subscribed - 3G UE
R36. Device Aggression Management	GSM-BTR-1-1708	[1]Device Behavior upon Ignored RRC Connection Request during CS PS Registration - 3GUE
R36. Device Aggression Management	GSM-BTR-1-1726	[1]Device Behavior upon Ignored GPRSAttach RAU - 3GUE

R36. Device Aggression Management	GSM-BTR-1-1728	[1]Device Behavior upon Ignored Activate PDP Context - 3GUE
R36. Device Aggression Management	GSM-BTR-1-1730	[1]Device Behavior upon Ignored LAU - 3G UE
R36. Device Aggression Management	GSM-BTR-1-1732	[1]Device Behavior upon Ignored GPRSAttach RAU - 2G UE
R36. Device Aggression Management	GSM-BTR-1-1734	[1]Device Behavior upon Ignored Activate PDP Context - 2G UE
R36. Device Aggression Management	GSM-BTR-1-1736	[1]Device Behavior upon Ignored LAU - 2G UE
R36. Device Aggression Management	LTE-BTR-1-1802	[1]Device behavior upon receiving EMM Attach Reject with ESM Cause on EUTRAN
R36. Device Aggression Management	LTE-BTR-1-1804	[1]Device behavior during ALU MME Overload - EMM CM SERVICE REQUEST IGNORE REJECT #22, ATTACH TAU REJECT #22, UTRAN available
R36. Device Aggression Management	LTE-BTR-1-1806	[1]Device behavior during E MME Overload - EMM CM SERVICE REQUEST IGNORE REJECT #22, ATTACH TAU REJECT IGNORE, UTRAN available
R36. Device Aggression Management	LTE-BTR-1-1808	[1]Device behavior upon receiving mixed EMM Attach and TAU Rejects
R36. Device Aggression Management	LTE-BTR-1-1810	[1]Voice-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 17 - Network Failure on EUTRANNote This test is applicable to Voice Centric devices only
R36. Device Aggression Management	LTE-BTR-1-1812	[1]Data-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 17 - Network Failure on EUTRANNote This test is applicable to Data Centric devices only
R36. Device Aggression Management	LTE-BTR-1-1814	[1]Voice-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 34 - Service option temporarily out of order on EUTRANNote This test is applicable to Voice Centric devices only
R36. Device Aggression Management	LTE-BTR-1-1816	[1]Data-Centric Device behavior upon receiving EMM Attach Accept for EPS Services only with EMM Cause # 34 - Service option temporarily out of order on EUTRAN on EUTRANNote This test is applicable to Data Centric devices only
R36. Device Aggression Management	LTE-BTR-1-1818	[1]Voice- Centric Device behavior during ALU MME Overload - EMM EXTENDED SERVICE REQUEST REJECT #22, ATTACH TAU REJECT #22, UTRAN available
R36. Device Aggression Management	LTE-BTR-1-1820	[1]Device behavior when both E-UTRAN and UTRAN are overloaded E-UTRAN - EMM IGNORE REJECT #22, UTRAN - CS domain available (Location Update OK); PS domain overloaded (ATTACH RAU Ignore)
R36. Device Aggression Management	LTE-BTR-1-1824	[1]Device behavior when both E-UTRAN and UTRAN are overloaded E-UTRAN - EMM IGNORE REJECT #22, UTRA - CS domain overloaded (LU rejected with cause #22); PS domain overloaded (ATTACH RAU rejected with cause #17)

R36. Device Aggression Management	LTE-BTR-1-1826	[1]Device behavior when both E-UTRAN and UTRAN are abnormal E-UTRAN - EMM REJECT #111, UTRAN - CS domain overloaded (LU Ignore); PS domain normal
R36. Device Aggression Management	LTE-BTR-1-1828	[1]Voice-Centric Device behavior when both E-UTRAN and UTRAN are abnormal E-UTRAN - ATTACH TAU Accept for EPS Services only, EMM cause not included, UTRAN - CS domain overloaded (MM Reject #22 Congestion); PS domain normalNote This test is applicable to Voi
R36. Device Aggression Management	LTE-BTR-1-1830	[1]Device behavior when RRC Connection Requests are repeatedly rejected on E-UTRAN at power up
R36. Device Aggression Management	LTE-BTR-1-1836	[1]Device behavior when RRC Connection Requests are repeatedly ignored on E-UTRAN at power up
R36. Device Aggression Management	LTE-BTR-1-1838	[1]Device behavior when RRC Connection Requests, which are trigger by CM Service Request, are repeatedly rejected on E-UTRAN
R36. Device Aggression Management	LTE-BTR-1-1842	[1]Verify that LTE is not disabled for AT&T network when roaming LTE network is overload
R36. Device Aggression Management	LTE-BTR-1-1844	[1]Device behavior when PDN Connectivity Request to IMS APN is rejected with temporary cause on E-UTRAN
R36. Device Aggression Management	LTE-BTR-1-1846	[1]Device behavior when PDN Connectivity Requests to IMS APN are ignored on E-UTRAN
R36. Device Aggression Management	LTE-BTR-1-1848	[1]Device behavior upon receiving EMM Attach Reject with ESM Cause on EUTRAN
R36. Device Aggression Management	LTE-BTR-1-1850	[1]Device behavior when TAU Attach requests are ignored by network
R36. Device Aggression Management	LTE-BTR-1-1852	[1]Device behavior when service requests are rejected by network
R36. Device Aggression Management	LTE-BTR-1-1854	[1]Device behavior when RRC Connection Requests are repeatedly rejected on E-UTRAN at power up
R38. S.I.A.	GSM-BTR-1-2402	[1]Dormant Mode
R69. SIM OTA Global SIM	LTE-BTR-1-9794	[1]V2 V3 Power On - Verify Terminal Profile and STK commands
R69. SIM OTA Global SIM	LTE-BTR-1-9798	[1]V2 V3 Subscription Load(HTTPOTA) + Switch from Provisioning Container 1 Profile Container 2 (SUCCESS)
R69. SIM OTA Global SIM	LTE-BTR-1-9799	[1]V2 V3 Subscription Switch from Profile Container 2 Provisioning Container 1 + Subscription Removal(HTTPOTA) + (SUCCESS)
R69. SIM OTA Global SIM	LTE-BTR-1-9800	[1]V2 V3 Subscription Load(HTTPOTA) - Different Default APN
R69. SIM OTA Global SIM	LTE-BTR-1-9801	[1]V2 V3 Subscription Switch from Provisioning Container 1 Invalid Profile Container 2 (Confirm Fallback)
R69. SIM OTA Global SIM	LTE-BTR-1-9802	[1]V2 V3 Subscription Switch from Provisioning Container 1 Profile Container 2 On a 5min. Voice Call
R69. SIM OTA Global SIM	LTE-BTR-1-9803	[1]V2 V3 Subscription Switch from Provisioning Container 1 Profile Container 2 On a 25min Voice Call

R69. SIM OTA Global SIM	LTE-BTR-1-9806	[1]Subscription Load and Switch to SLOT1 SLOT2 (SUCCESS)
R69. SIM OTA Global SIM	LTE-BTR-1-9807	[1]Subscription Switch and Delete to SLOT2 SLOT1 (SUCCESS)
R69. SIM OTA Global SIM	LTE-BTR-1-9808	[1]Subscription Load and Switch to SLOT1 SLOT2 (FAILURE - FALLBACK) SLOT1
R69. SIM OTA Global SIM	LTE-BTR-1-9809	[1]Subscription Load and Switch to SLOT1 SLOT2 (SUCCESS) On a Voice Call

5.2. IMS VoLTE Test Areas

The follow sub-sections list the test areas that are applicable for VoLTE capable NR-AM-DV Connected Car devices. These test cases are specified for fully-featured VoLTE devices that assume the presence of features that are not necessarily supported by Connected Car devices. As such many test cases may not be applicable or within applicable test cases a certain test step may not be applicable. For these reasons it is important to review and understand this section.

The following is a list of the most common features that are not supported by Connect Car Modules & TCUs. This is required to be thoroughly reviewed for each Connect Car Module to determine the applicable test scope.

Common Unsupported Features
Call Holding
Call Waiting
Caller ID
Conference Calling
DTMF
E911
IMS Toggle
SMS
Supplementary Services
User Defined Dialing

Every test case that is determined to be Not Applicable (N/A) due to a specific feature not supported by the Connected Car, must have that specific feature annotated in the comments. Generic comments that do not call out the specific unsupported feature are not acceptable.

5.2.1. A86 IMS VoLTE

From the common unsupported features, the following is a list of possibly impacted test cases. The exact test cases impacted may change with updates to the test area, so always refer to the latest document referenced in 10776 for current information.

Test Case BTR #	Test Case #	Comments
LTE-BTR-5-5400	5.1	
LTE-BTR-5-5442	8.4	
LTE-BTR-5-5444	8.5	
LTE-BTR-5-5446	8.6	
LTE-BTR-5-5448	8.7	
LTE-BTR-5-5450	8.8	
LTE-BTR-5-5452	8.9	
LTE-BTR-5-5454	8.1	
LTE-BTR-5-5466	10.2	Requires dial pad or voice dialing
LTE-BTR-5-5468	10.3	Requires dial pad or voice dialing
LTE-BTR-5-5474	12.1	Requires conference calling functionality
LTE-BTR-5-5478	12.3	Requires conference calling functionality
LTE-BTR-5-5482	13.2	Requires SMS functionality
LTE-BTR-5-5484	13.3	Requires SMS functionality
LTE-BTR-5-5536	15.1	
LTE-BTR-5-5538	15.2	DTMF portion will fail if not supported, TC always applicable
LTE-BTR-5-5542	15.4	
LTE-BTR-5-5544	15.5	DTMF portion will fail if not supported, TC always applicable
LTE-BTR-5-5552	12.2	Requires conference calling functionality
LTE-BTR-5-5583	7.4	
LTE-BTR-5-5587	7.5	

5.2.2. A72 IMS VoLTE Border

From the common unsupported features, the following is a list of possibly impacted test cases. The exact test cases impacted may change with updates to the test area, so always refer to the latest document referenced 10776 for current information.

Test Case BTR #	Test Case #	Comments
LTE-BTR-5-7922	1.2	
LTE-BTR-5-7924	1.3	

LTE-BTR-5-7926	1.4	Requires E911
LTE-BTR-5-7928	1.5	Requires E911
LTE-BTR-5-7930	1.6	
LTE-BTR-5-7932	1.7	
LTE-BTR-5-7940	1.11	Requires E911
LTE-BTR-5-7942	1.12	Requires E911

5.2.3. A95 IMS VoLTE Ut Interface

All Ut interface test plans require the support of supplementary services. Typically, a Connected Car device either supports the entire test section or none of it.

Test Case BTR #	Test Case #	Comments
LTE-BTR-5-4200	5.1	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4202	5.4	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4204	5.6	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4206	5.8	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4208	5.5	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4210	5.3	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4212	5.2	Requires CWI, call diversion, & call forwarding support
LTE-BTR-5-4214	5.7	Requires CWI, call diversion, & call forwarding support

Appendix A: Throughput and Ping Metrics

Note: When results are noted as “Pass with review”, then these results need to be checked with the BPC to ensure that they are acceptable

Table 1 UMTS (3G) DL Throughput metrics

DL UE HS Category	Cat 14 DL				Cat 10 DL				Cat 8 DL				Cat 6 DL		
	Pass	Pass with review	Fail		Pass	Pass with review	Fail		Pass	Pass with review	Fail		Pass	Pass with review	Fail
HTTP/UDP DL	>6.5 Mbps	6-6.5Mbps	<6Mbps		>5.5 Mbps	5- 5.5 Mbps	< 5 Mbps		>3 Mbps	2.5-3 Mbps	< 2.5 Mbps		> 1 Mbps	800-1Mbps	< 800 kbps

Table 2 UMTS UL Throughput and Ping Metrics

UL UE HS Category															
Data device	R99 UL				Cat 3 UL				Cat 4/5/6 UL (10ms TTI)				Cat 6 UL (2ms TTI)		
	Pass	Pass with Review	Fail		Pass	Pass with Review	Fail		Pass	Pass with Review	Fail		Pass	Pass with Review	Fail
FTP/UDP UL	>275 Kbps	250-275 Kbps	<250 Kbps		>1 M	950-1000 Kbps	<950 Kbps		>1 Mbps	950 Kbps-1Mbps	< 950 Kbps		>2.2 Mbps	1.8-2.2 Mbps	< 1.8 Mbps
Ping	<190ms	190-250ms	>250 ms		<19 0ms	190- 250ms	>250 ms		<150 ms	150- 200ms	>200 ms		<120 ms	120- 150ms	>150 ms

Table 3 LTE DL Throughput Metrics

10Mhz LTE Network Criteria for Cat 1 device	LTE UE Category 1	HTTP/FTP DL			Ping Latency
		Pass (Max of 5 test cycles)	Pass with review	Fail	Pass
	Data Cards/Data devices - /Mobile Hot spot	> 8.5 Mbps	8.5 – 6.5 Mbps	< 6.5 Mbps	Less than <70ms. If this is greater than 70ms, please note that as “Pass with review” to be reviewed by BPC
10Mhz LTE Network Criteria for Cat 2/3 devices	LTE UE Category 2 or Category 3	HTTP/FTP DL			Ping Latency
		Pass (Max of 5 test cycles)	Pass with review	Fail	Pass
	Data Cards/Data devices - /Mobile Hot spot	> 25 Mbps	20 - 25 Mbps	< 20 Mbps	Less than <70ms. If this is greater than 70ms, please note that as “Pass with review” to be reviewed by BPC
Aggregated 15 and 20 MHz	LTE UE Category 4	HTTP/FTP DL			
		Pass (Max of 5 test cycles)	Pass with review	Fail	
	Data Cards/Data devices - 20 MHz BW	>50 Mbps	40-50Mbps	<40Mbps	
Aggregated 30 MHz	LTE UE Category 6	HTTP/FTP DL			
		Pass (Max of 5 test cycles)	Pass with review	Fail	
	Data Cards/Data devices 30 MHz BW	> 135 Mbps			

Table 2 LTE UL Throughput metrics

10 MHz LTE Network. Criteria for CAT2 = CAT3, unless specified	LTE UE Category 2 or Category 3	HTTP/FTP UL		
		Pass (Max of 5 test cycles)	Pass with review	Fail
	Data Cards/Data devices - /Mobile Hot spot	> 15 Mbps	10 - 15 Mbps	< 10 Mbps