Interface Document for Communication between Panasonic/Clarion Head Unit and BT Card

(Customer Shared Document)

Version: 3.4

Release Date: 21st of November, 2011

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1 Preface and Sign Off

1.1 Preface

This specification defines the UART Protocol and message set details to be used for communication between the HU and BT Card.

Details contained within this document include the definition of messages related to those features, what the messages do, how the messages are used, and how status information is reported.

1.2 Confidentiality

TBD

1.3 Sign off for Version TBD

Nissan:

Visteon: Rob Benedict

Panasonic:

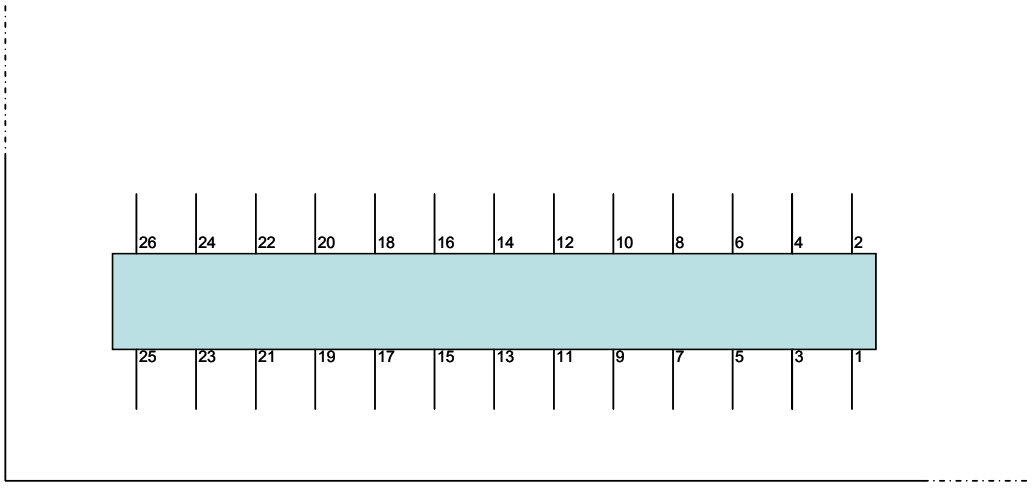
Clarion:

1.4 Definitions and Abbreviations

Acronym	Description
BT	Blue Tooth
UART	Universal Asynchronous Receiver/Transmitter
DC	Daughter Card
TBD	To be Determined
VR	Voice recognition
IPCL	Inter-processor communication link
DA	Display Audio
HU	Head Unit
IT-M	IT Master head Unit

2.2 Pin Definitions

Connector: Samtec MMT-113-01-T-DV-A-P-TR. (P/N may change depending on actual pin lengths)

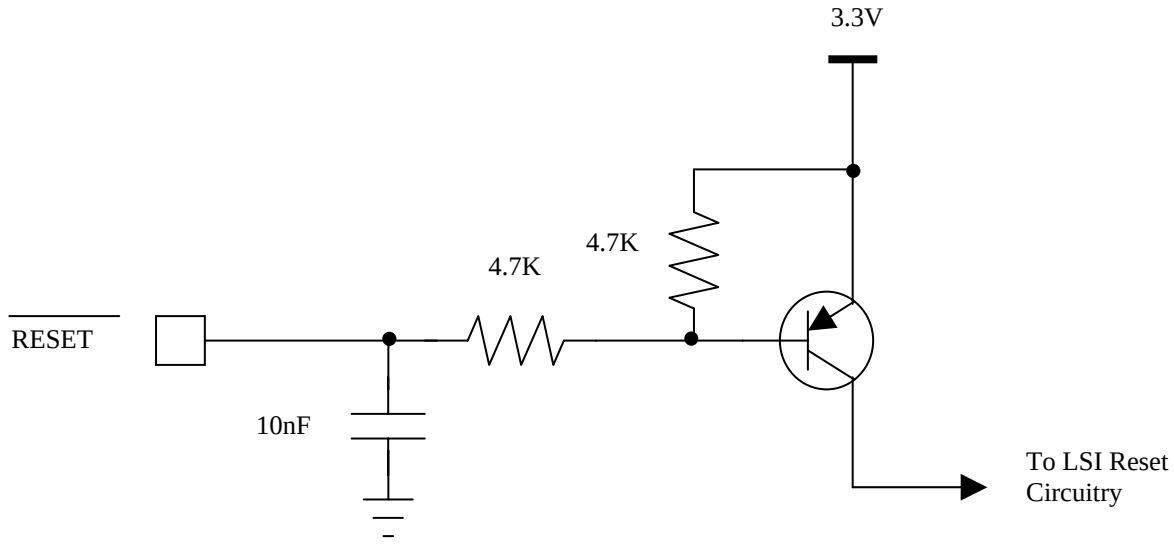


Lower Left corner of DC, as seen from Top

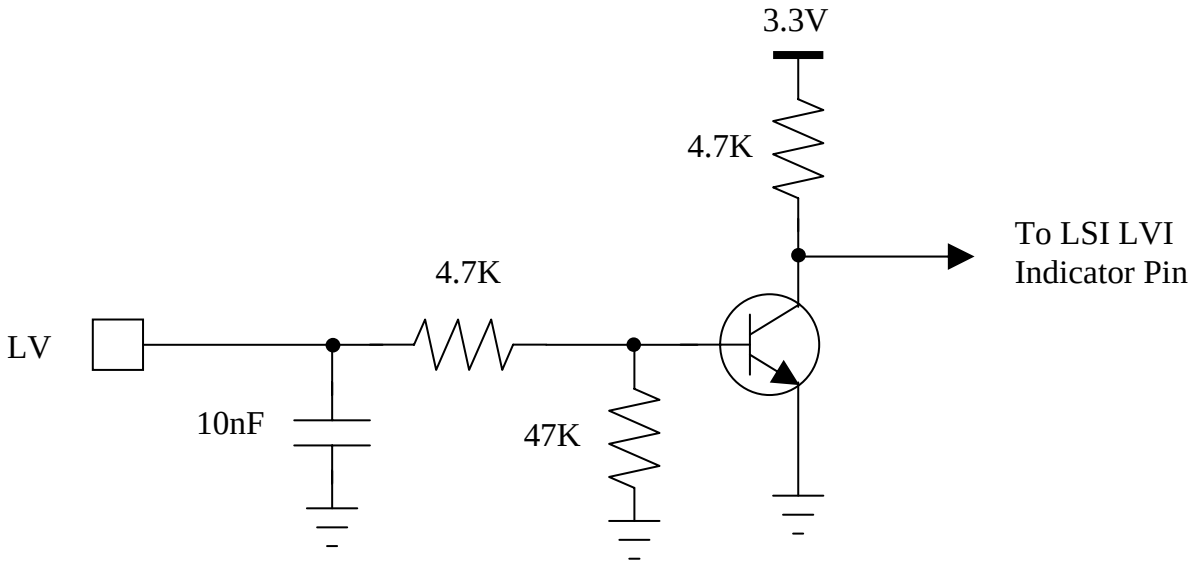
Name	Pin	I/O Direction	Description	Electrical Characteristics						Remarks
				Min Voltage	Nom Voltage	Max Voltage	Max Current	Typical Current	Frequency	
Mic in+	1	Input	Mic input	-	-	4.72V_{pp}			200Hz-6kHz	
Mic in -	2	Input	Mic input			-			-	
GND	3	-	Ground							
NC	4	-	No Connection							
Aud L+	5	Output	Differential Analog Audio Output			800mVrms				
Aud R+	6	Output	Differential Analog Audio Output			800mVrms				
Aud L-	7	Output	Differential Analog Audio Output			800mVrms				
Aud R-	8	Output	Differential Analog Audio Output			800mVrms				
Enable	9	Input	DC enable line High State	1.4V				150µA		
			DC Enable line Low State			.2V		20µA		
Debug TX	10	Output	Serial Debug							
REQ*	11	Output	UART Serial Comm. High State		3V			-60µA		
			UART Serial Comm. Low State		.3V			5mA		
Debug RX	12	Input	Serial Debug							
EXT_PGM	13	Input	Programming							
DC TX	14	Output	UART Serial Comm.						38.4kbps	
USB D+	15	I/O	Programming			3.3V			12MHz	
DC RX	16	Input	UART Serial Comm.						38.4kbs	

Name	Pin	I/O Direction	Description	Electrical Characteristics						Remarks
				Min Voltage	Nom Voltage	Max Voltage	Max Current	Typical Current	Frequency	
USB D-	17	I/O	Programming			3.3V			12MHz	
GND	18	-	Ground							
GND	19	-	Ground							
NC	20	-	No Connection							
Reset*	21	Input	Reset control High state	3 V				-32µA		
			Reset Control Low State			1 V		-340µA		
LVI	22	Input	Low Voltage Indication High State	1.4V				150µA		
			LVI Low State			.2V		20µA		
GND	23	-	Ground							
GND	24	-	Ground							
3.3V	25	Input	Power	3.135V	3.3V	3.465V				
3.3V	26	Input	Power	3.135V	3.3V	3.465V				

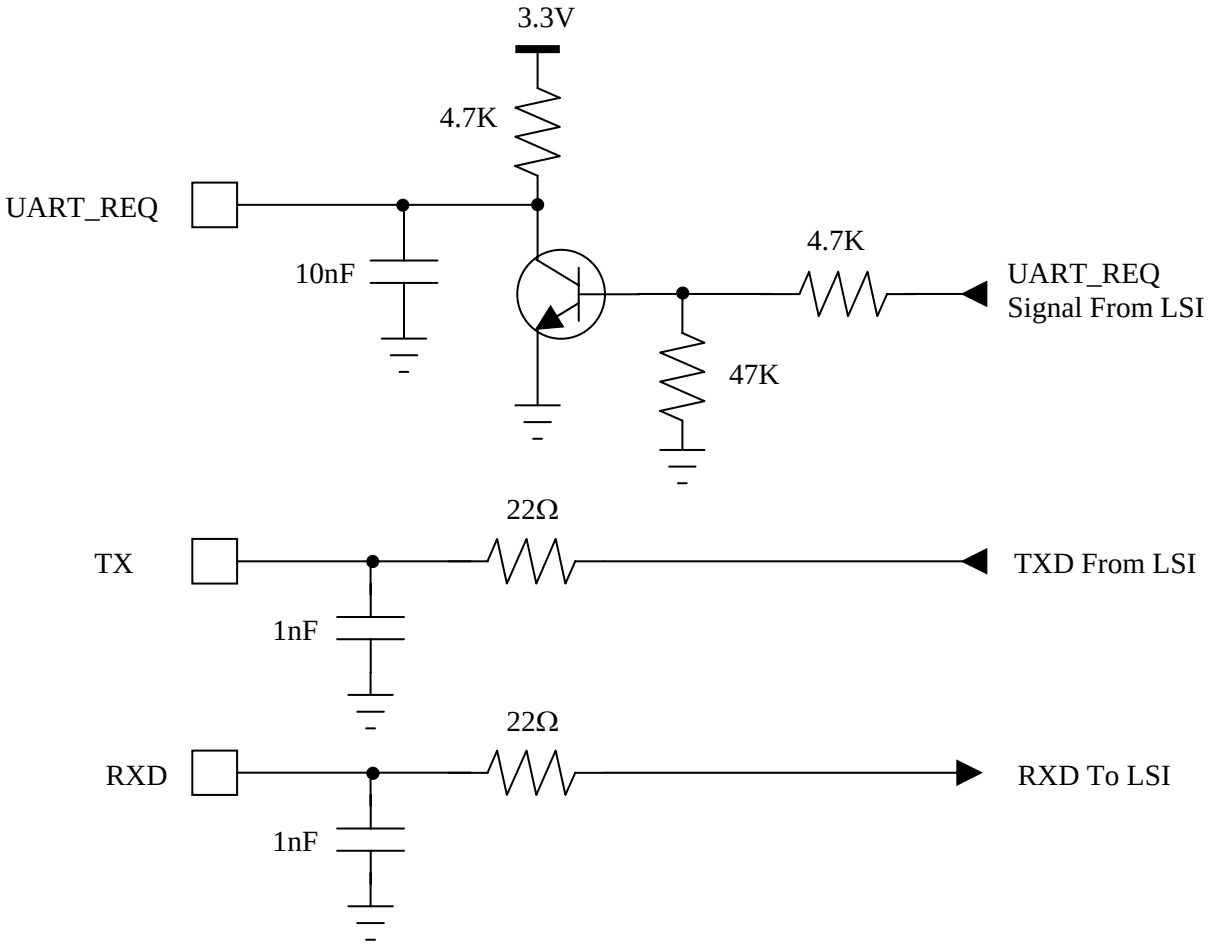
2.2.1 Reset Pin Interface Circuit



2.2.2 LVI Pin Interface Circuit

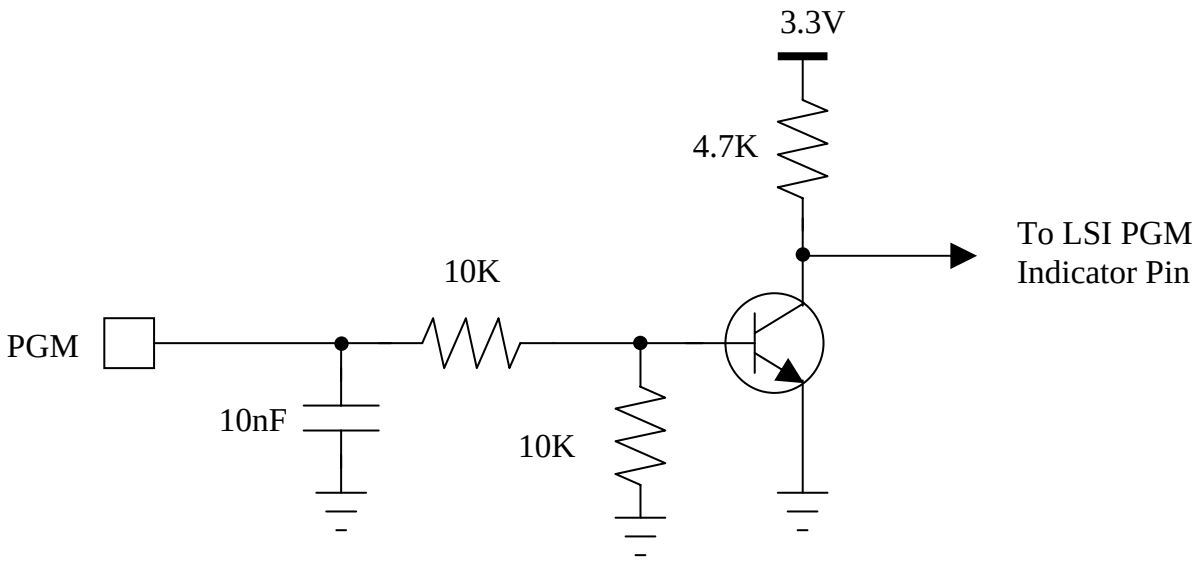


2.2.3 UART Interface Circuit

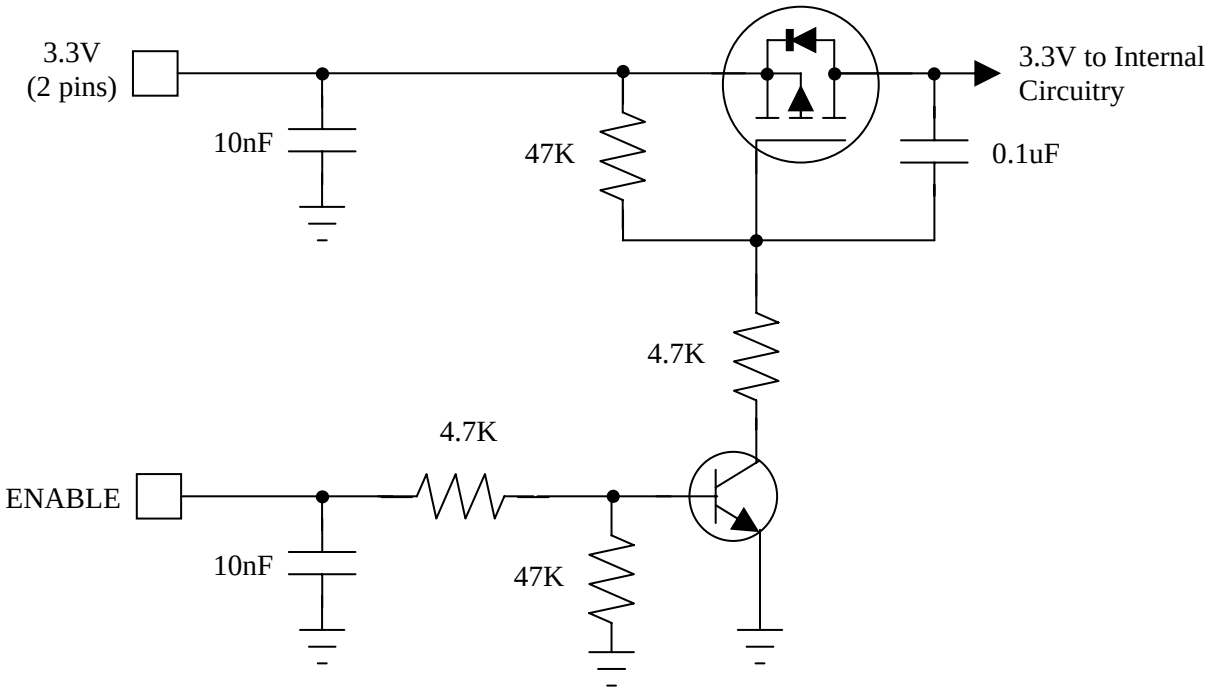


Note: HU must hold these pins low when enable line is low.

2.2.4 PGM Pin interface Circuit

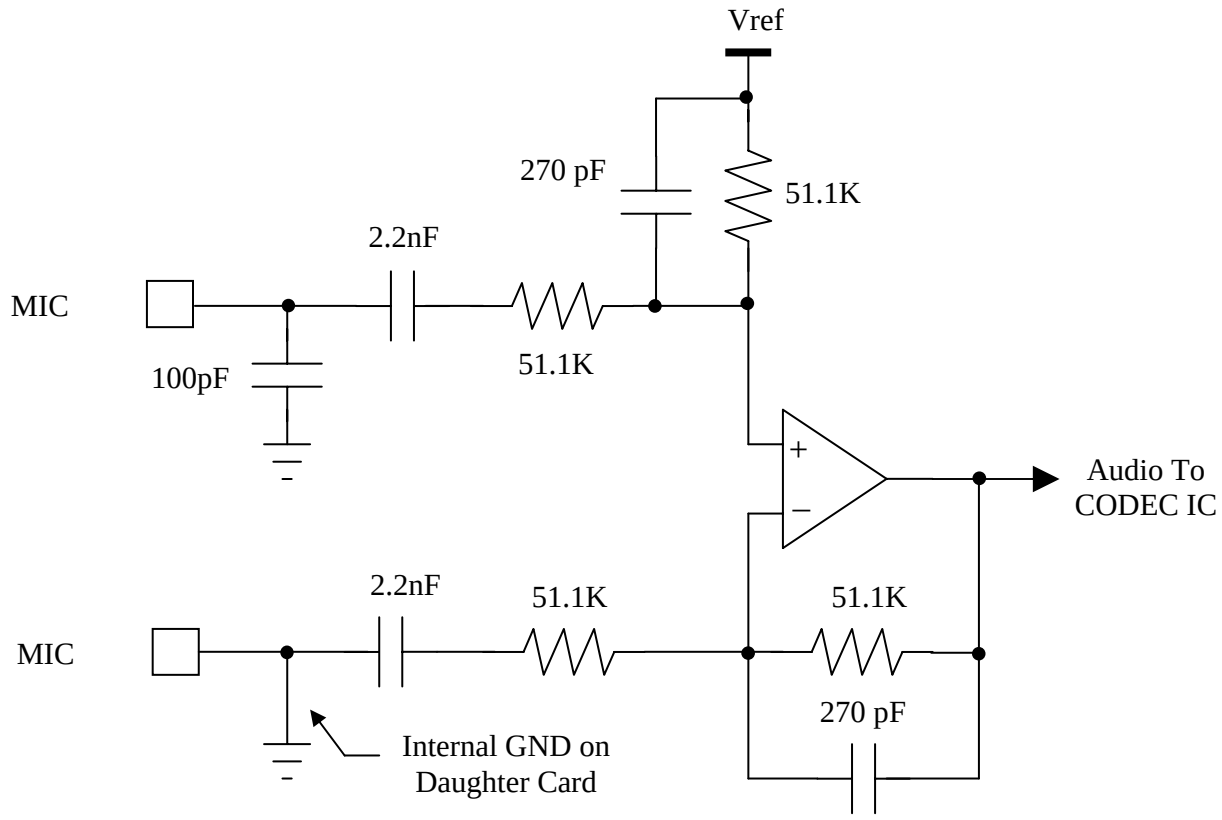


2.2.5 3.3V Power and Enable Interface Circuit



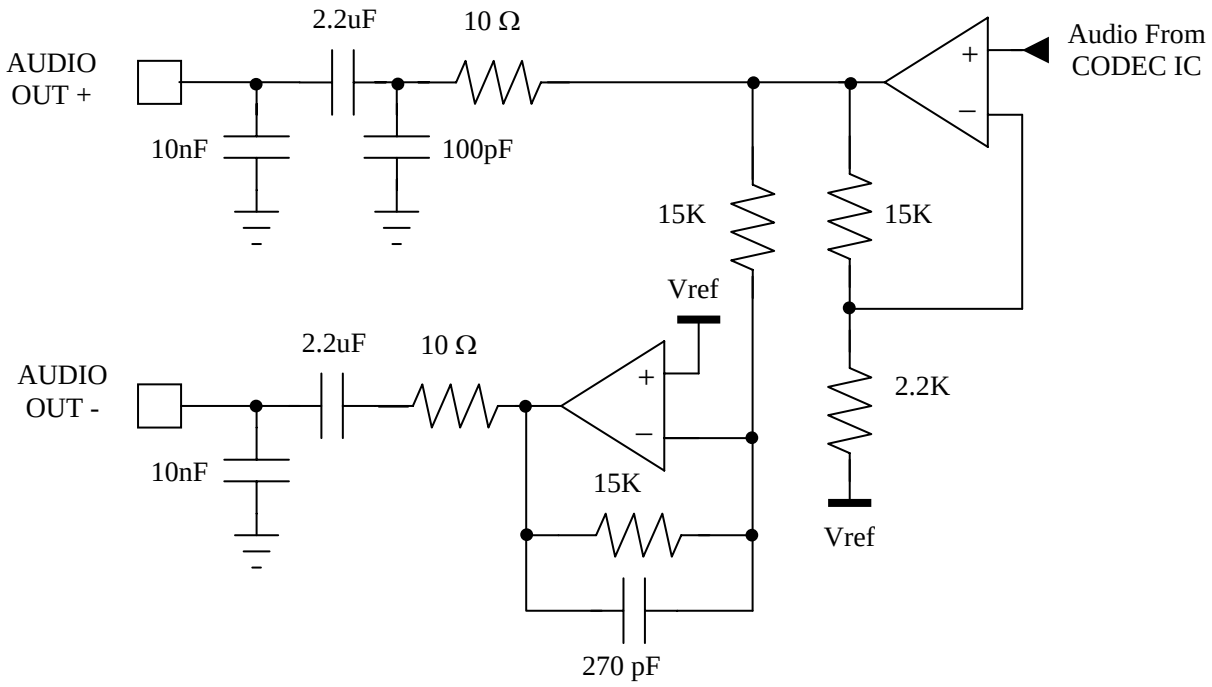
Note: When Enable is Low, UART communication Pins 11 (REQ), 14 (TX) and 16 (RX) must also be held low.

2.2.6 Microphone Interface Circuit

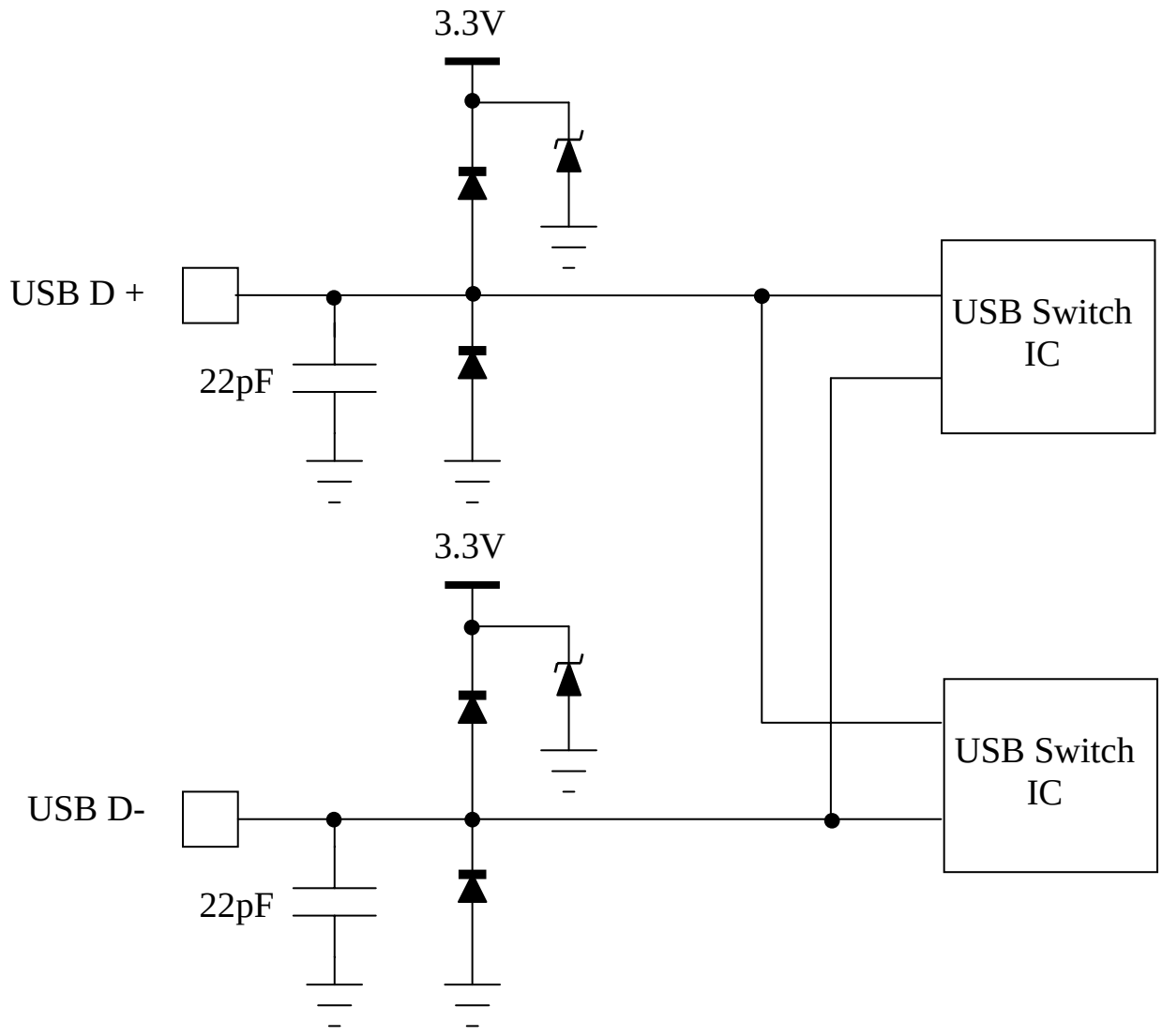


2.2.7 Audio Out Interface Circuit

Same circuitry for both Left and Right channels

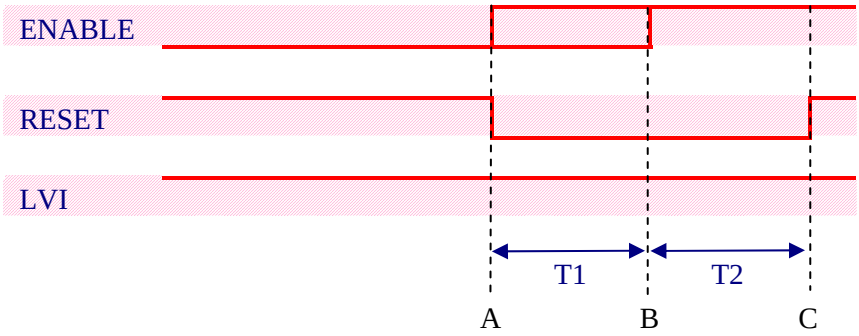


2.2.8 USB Interface Circuit



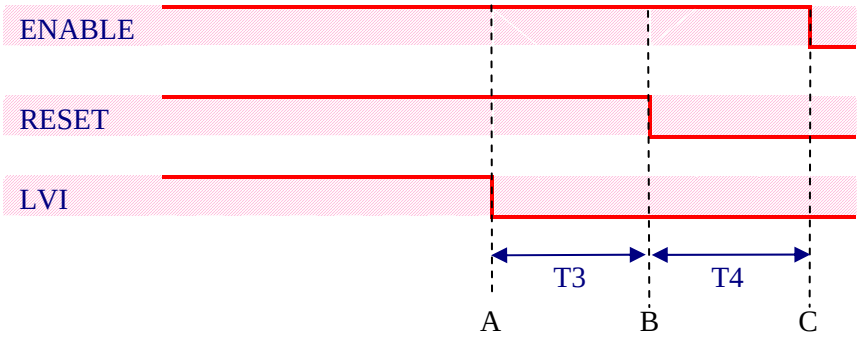
2.3 Hardwire Startup Diagram

2.3.1 Startup



Item	Description
A	The Head Unit has asserted the Reset line at the same time or before the Enable line has been asserted.
B	The Enable line has been asserted for >= 5ms. The regulator needs 5ms for the on board power supply to settle.
C	The Head Unit releases the Reset line allowing the DC to begin the initialization.
T1	>= 5ms
T2	>= 0ms. The Reset line can be released anytime after the Enable line has been asserted for >= 5ms.

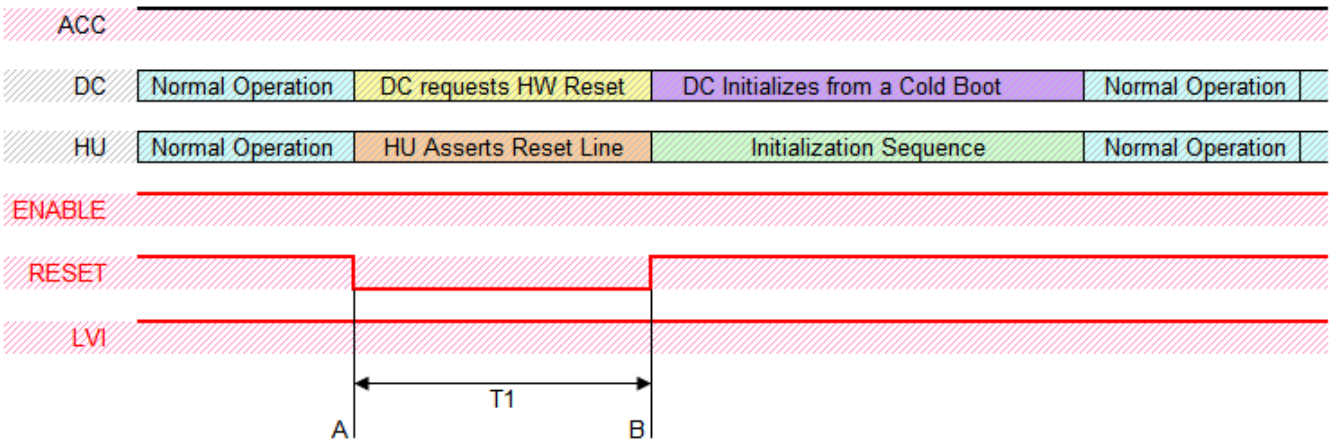
2.3.2 Shutdown



Item	Description
A	Head Unit needs to shut down before the DC has completed the shutdown sequence. Head Unit asserts the LVI line.
B	Head Unit then waits >=5ms for the DC to shutdown internal sw components. The Head Unit asserts the Reset line.
C	At this point, both the LVI and Reset lines are being asserted. The Head Unit can now remove the Enable line at any time.
T3	>= 5ms

T4	>=0ms. The Enable line can be released anytime after the LVI line has been asserted for >= 5ms.

2.3.3 Reset



Item	Description
A	Head Unit asserts the Reset line.
B	Head Unit releases the Reset line.
T1	>= 800ms.

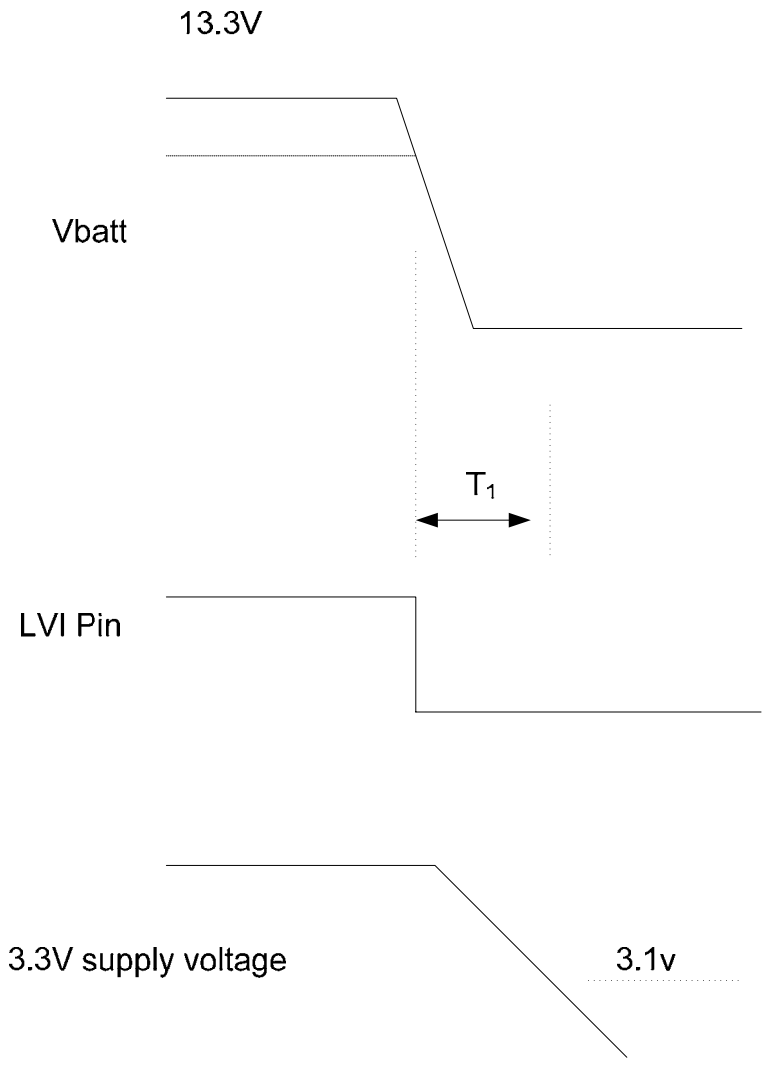
This timing diagram is used to show the timing required to execute the sequence “Request for Reset”.
This timing diagram is used to show the timing required to execute the Reset required during any reflash operation.

2.4 Radio Mute Pin

Not used.

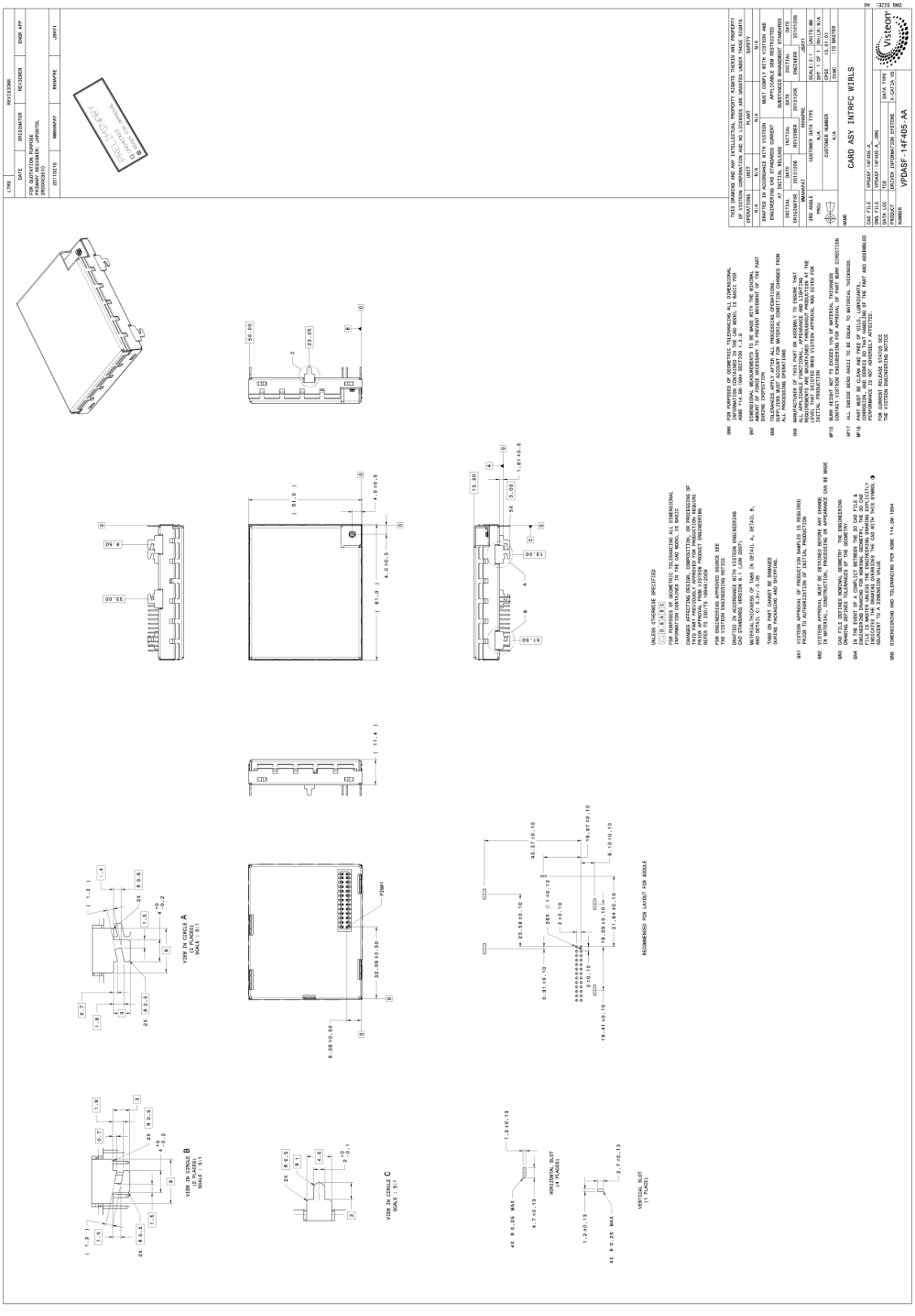
2.5 LVI Pin.

Discussion Point. The LVI pin is used for the HU to indicate to the DC that a low voltage event is happening and an abrupt termination of the 3.3V power supply is expected. T1 is the time for between LVI input is to toggled and when the 3.3V supply drops to below 3.1V. Visteon desires this to be ≥ 20 mSec, but is it understood this is not feasible in HU design. LVI pin is pulled low in such a way as to maximize the time T_1 before power supply and or reset line get pulled due to low battery condition at HU power supply.



Note: Enable and Reset remain high for at least T_1 seconds after LVI signal goes low.

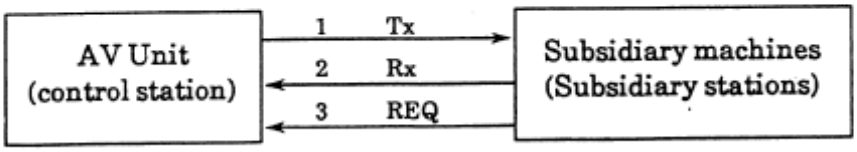
3 Mechanical Interfaces



4 UART Protocol

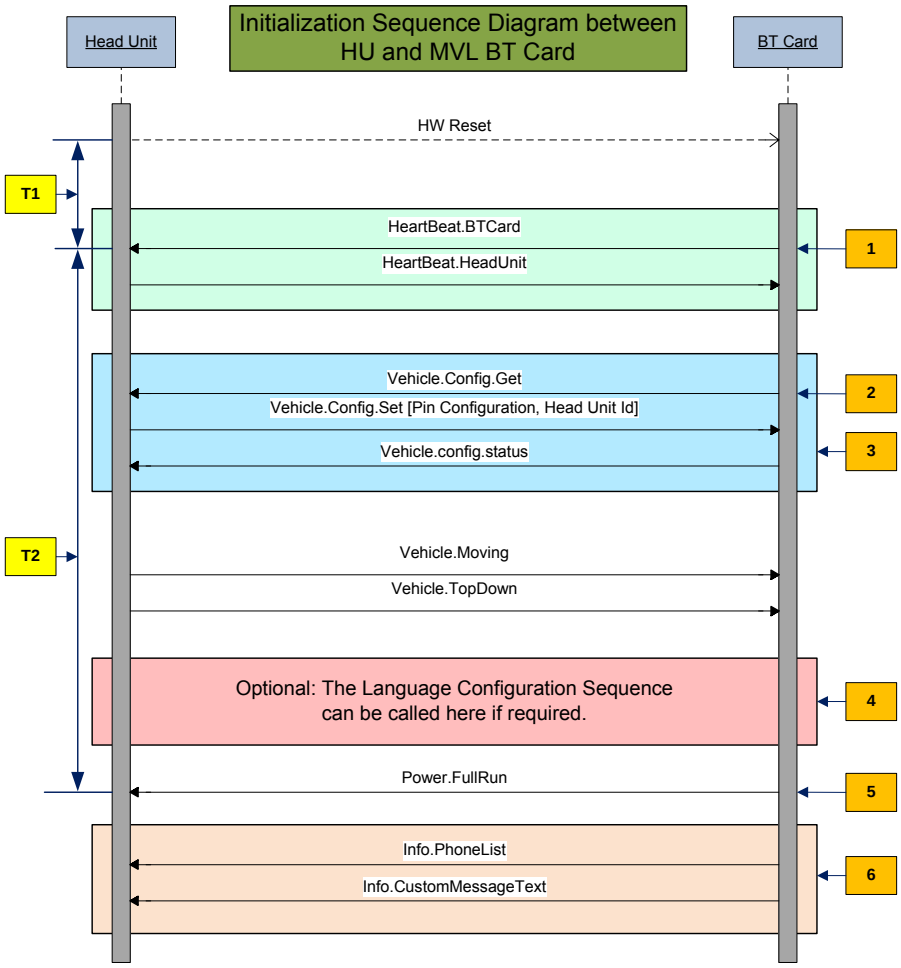
The low level protocol is defined in the reference specification 28330 NDS00 AVC System Comm Spec1.pdf. The HU shall be the AV Unit control station and the DC shall be the subsidiary machine. The Protocol will be implemented without a physical layer, and both the DC and HOos shall operate at 3.3V. Both HU and DC shall implement all features and modes (ie conversation mode) of the protocol as defined. A maximum Baud rate of 38.4 kbps shall be supported. While in normal operations, the Baud rate shall be 9600 bps. 38.4 kbps shall be supported for reflash operations.

Input/Output Interface Conditions among the Respective Subsidiary Machine of AV Unit



5 Sequence Diagrams

5.1 Initialization Sequence



1. This indicates OS and UART are up and running. If this is not received in T1 seconds, HU should strobe reset line again.
2. When the HeartBeat.HeadUnit is received by the DC, the DC start the Vehicle Config sequence. DC will continue to send HearBeat.BTCard messages to the Head Unit until a reply is sent.
3. The default configuration will be Panasonic if the value for Head Unit ID in the Vehicle.Config.Set message is undefined.
4. If the Language Change sequence is run, the Initialization time will increase by up to the maximum time called out in the sequence. This needs to be added to the T2 time as it will increase the time it takes for the DC to be fully initialized and ready to be used.
5. Only after FullRun is sent will the DC be able to accept any button press messages. All button press messages will be ignored before this.
6. These messages are for the Panasonic DA only

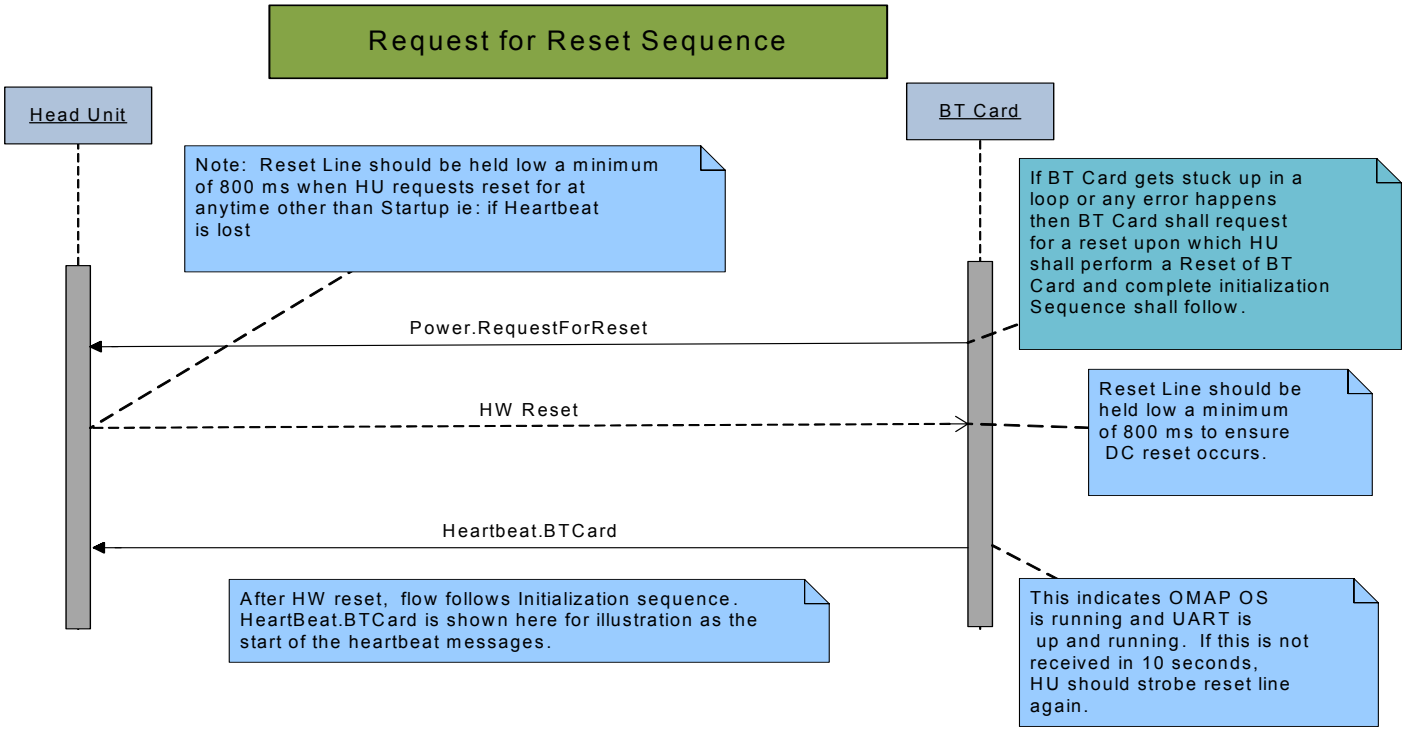
Notes:
The Language Change sequence has been removed from the Initialization Sequence. If a Language Change is called during Initialization, then the timing to be fully initialized and ready for button presses will increase by the Language Change timing.

Heartbeat messages are sent continuously throughout the operations of the DC.
The HU should not work off of the number of HeartBeat messages received during start up. The time out is to be used to determine the state of the DC during initialization.

T1 = $T_{TimeToBootToFirstHeartbeatMessage}$ = 15 seconds.
The maximum time it will take the DC to boot up to send the first HeartBeat message (From the time that power is applied, the Enable line asserted, Reset and LVI not asserted). If this time is exceeded, it is expected that the HU will reset the DC and perform the Mismatched Baud Rate sequence as

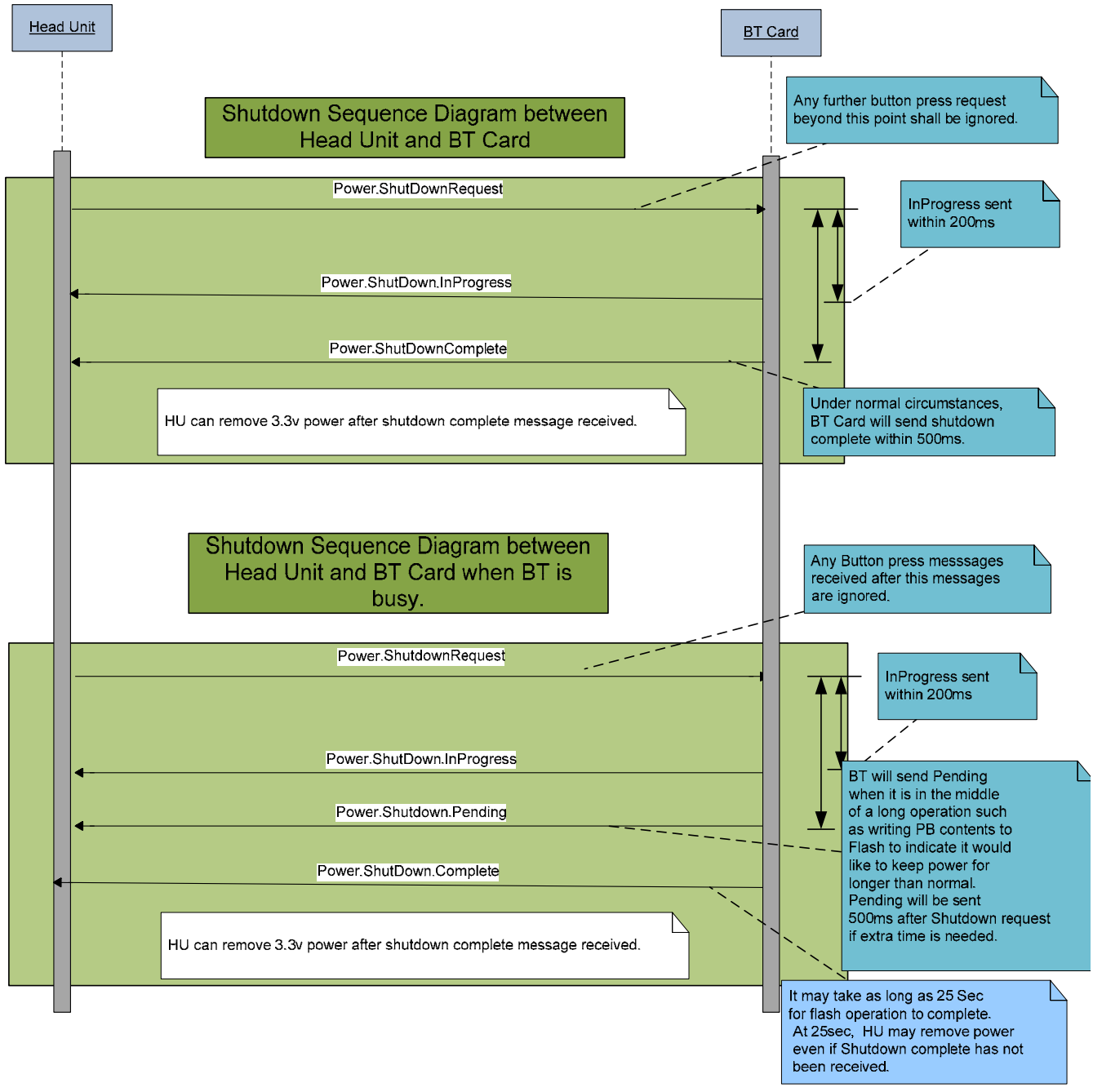
T2 = $T_{TimeToFinishInitAfterFirstHeartbeat}$= 6 seconds.
The maximum time it will take the DC to report that it is in the Full Run state and can begin to process button presses. If this time is exceeded, it is expected that the HU will reset the DC.

5.1.1 Request for Reset Sequence

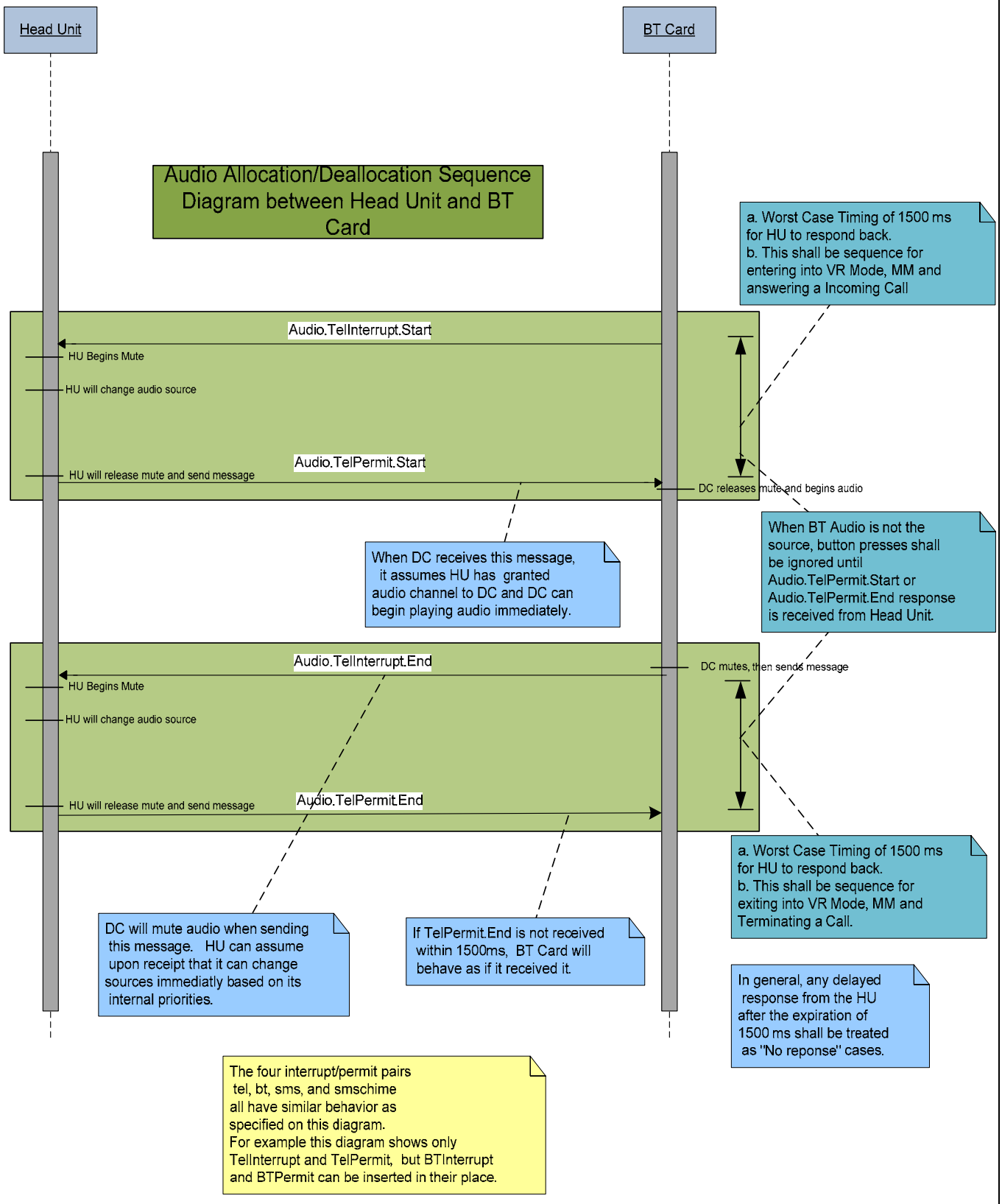


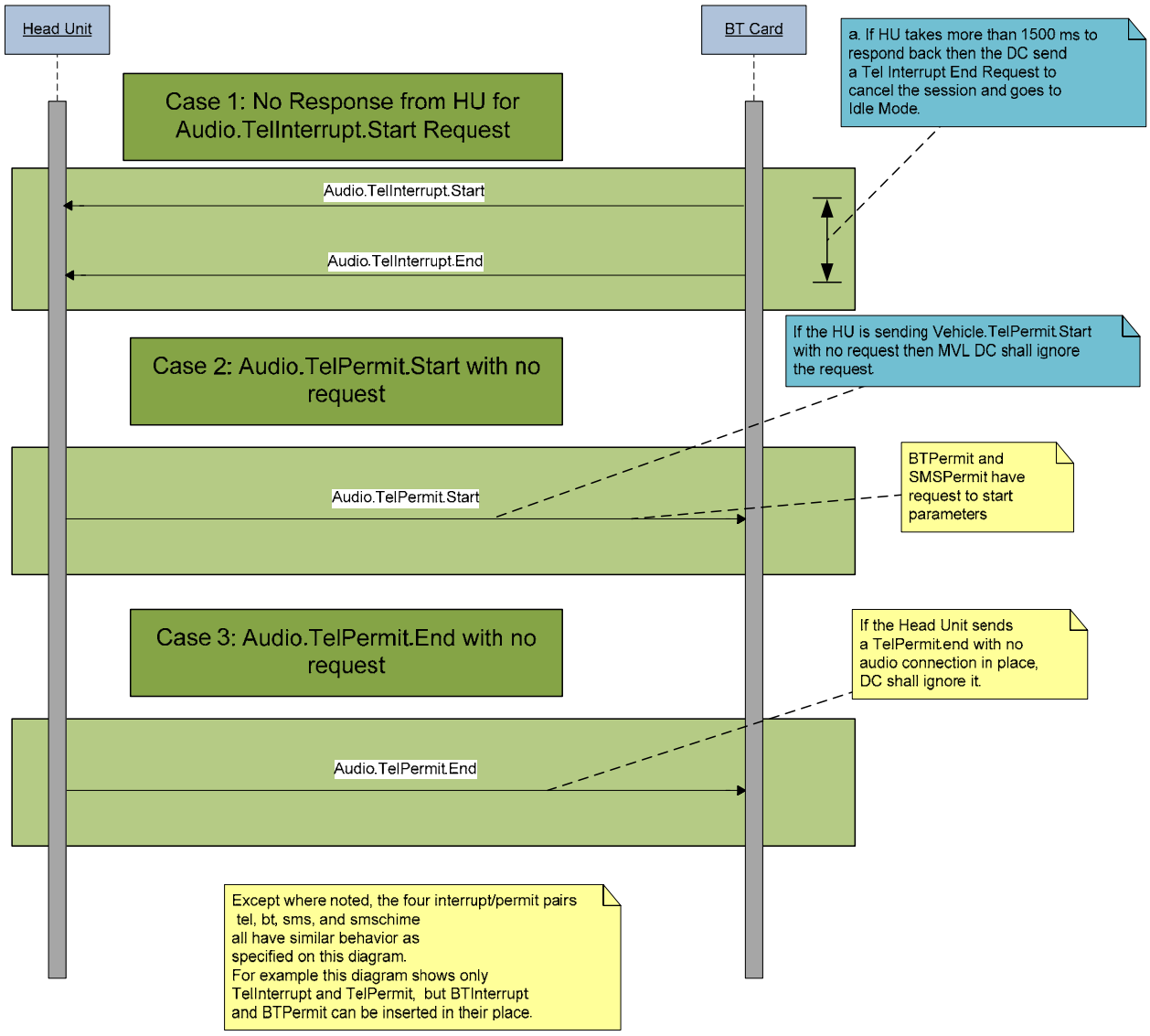
5.2 ShutDown Sequence

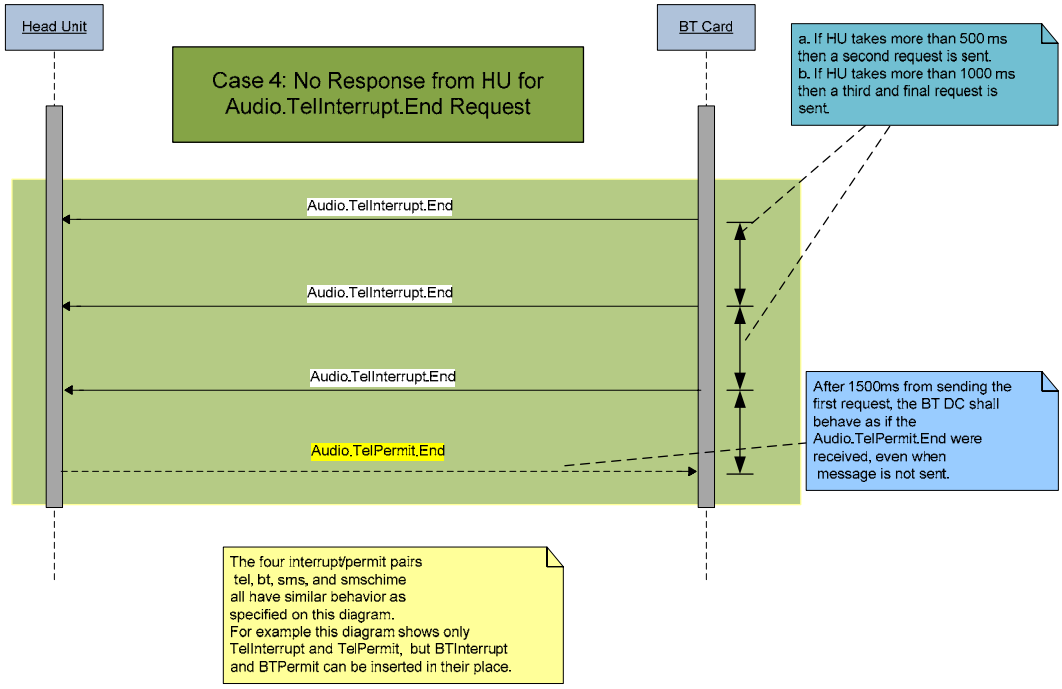
5.2.1 Normal Sequence

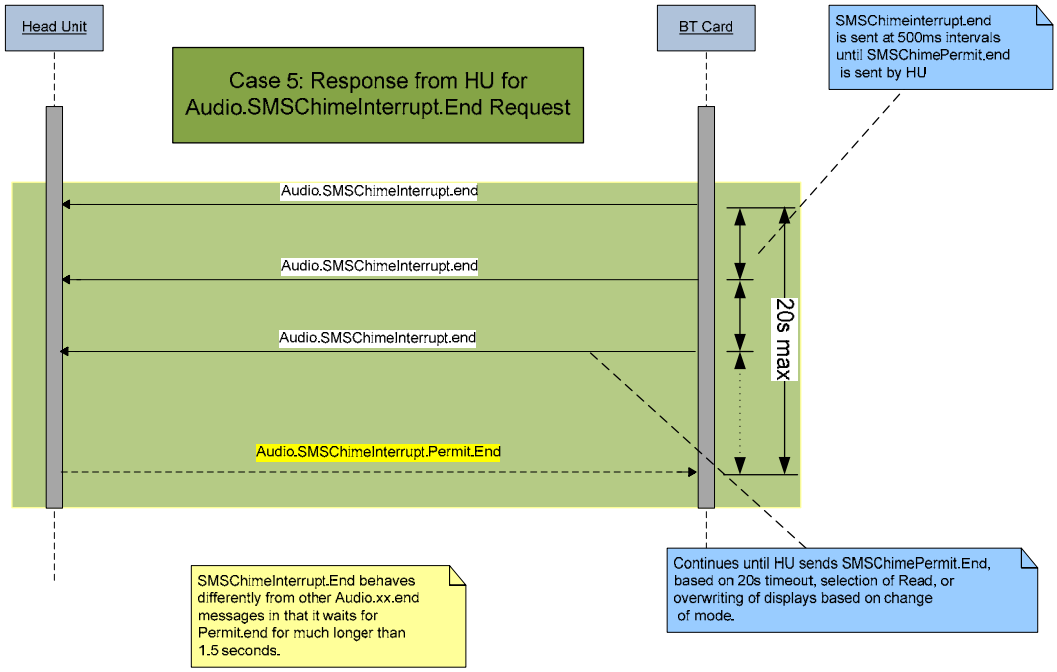


5.3 Audio Arbitration Sequences

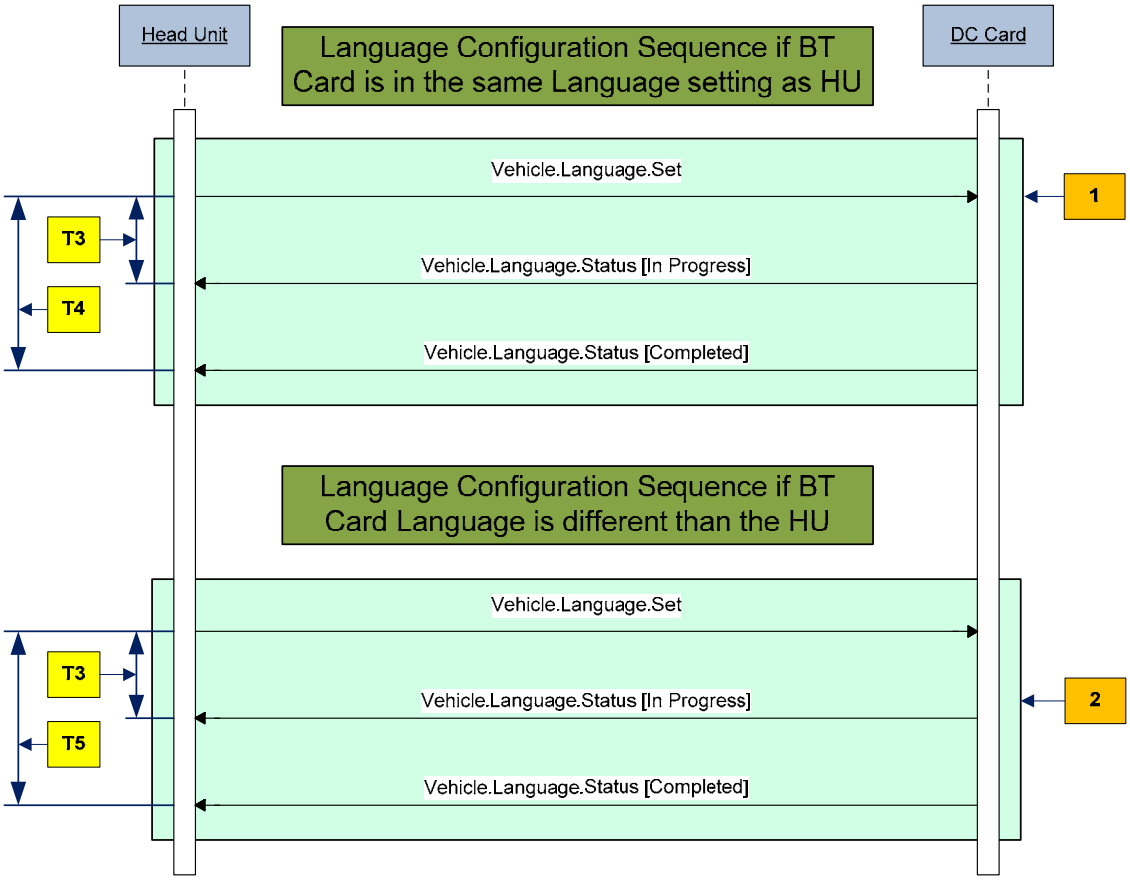



Head Unit
BT Card
a. If HU takes more than 1500 ms to respond back then the DC send a Tel Interrupt End Request to cancel the session and goes to Idle Mode.
Case 1: No Response from HU for Audio.TelInterrupt.Start Request
Audio.TelInterrupt.Start
Audio.TelInterrupt.End
If the HU is sending Vehicle.TelPermit.Start with no request then MVL DC shall ignore the request.
Case 2: Audio.TelPermit.Start with no request
Audio.TelPermit.Start
BTPermit and SMSPermit have request to start parameters
Case 3: Audio.TelPermit.End with no request
If the Head Unit sends a TelPermit.end with no audio connection in place, DC shall ignore it.
Audio.TelPermit.End
Except where noted, the four interrupt/permit pairs tel, bt, sms, and smschime all have similar behavior as specified on this diagram. For example this diagram shows only TelInterrupt and TelPermit, but BTInterrupt and BTPermit can be inserted in their place.


Head Unit
BT Card
Case 4: No Response from HU for Audio.TelInterrupt.End Request
a. If HU takes more than 500 ms then a second request is sent.
b. If HU takes more than 1000 ms then a third and final request is sent.
Audio.TelInterrupt.End
Audio.TelInterrupt.End
Audio.TelInterrupt.End
Audio.TelPermit.End
After 1500ms from sending the first request, the BT DC shall behave as if the Audio.TelPermit.End were received, even when message is not sent.
The four interrupt/permit pairs tel, bt, sms, and smschime all have similar behavior as specified on this diagram.
For example this diagram shows only TelInterrupt and TelPermit, but BTInterrupt and BTPermit can be inserted in their place.


Head Unit
BT Card
Case 5: Response from HU for Audio.SMSChimeInterrupt.End Request
SMSChimeinterrupt.end is sent at 500ms intervals until SMSChimePermit.end is sent by HU
Audio.SMSChimeInterrupt.end
Audio.SMSChimeInterrupt.end
Audio.SMSChimeInterrupt.end
20s max
Audio.SMSChimeInterrupt.Permit.End
SMSChimeInterrupt.End behaves differently from other Audio.xx.end messages in that it waits for Permit.end for much longer than 1.5 seconds.
Continues until HU sends SMSChimePermit.End, based on 20s timeout, selection of Read, or overwriting of displays based on change of mode.

5.4 Language Change Sequence



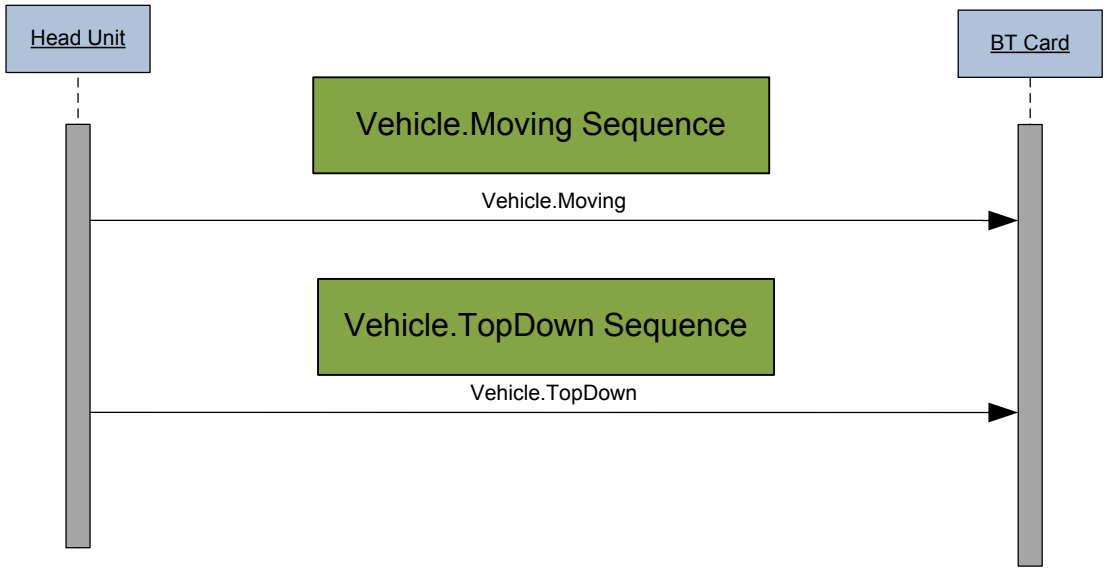
1. Language Change Sequence is for Panasonic only. For the Clarion Head Unit, the language change shall be done through the buttons on the Head Unit.
2. Language change will take no more than $T_{Lang\ Chg}$ to complete.

T3 = $T_{LangProgressResponse}$ = ~200ms
T4 = $T_{LangNoChgCompleted}$ = ~500ms
T5 = $T_{LangChgCompleted}$ = 15 seconds

T5 Notes:
If this time is exceeded, it is expected that the HU will reset the DC.
The time to complete the language change is not included in the Initialization Sequence and if executed will add up to a maximum of T3 time to the Initialization of the DC.

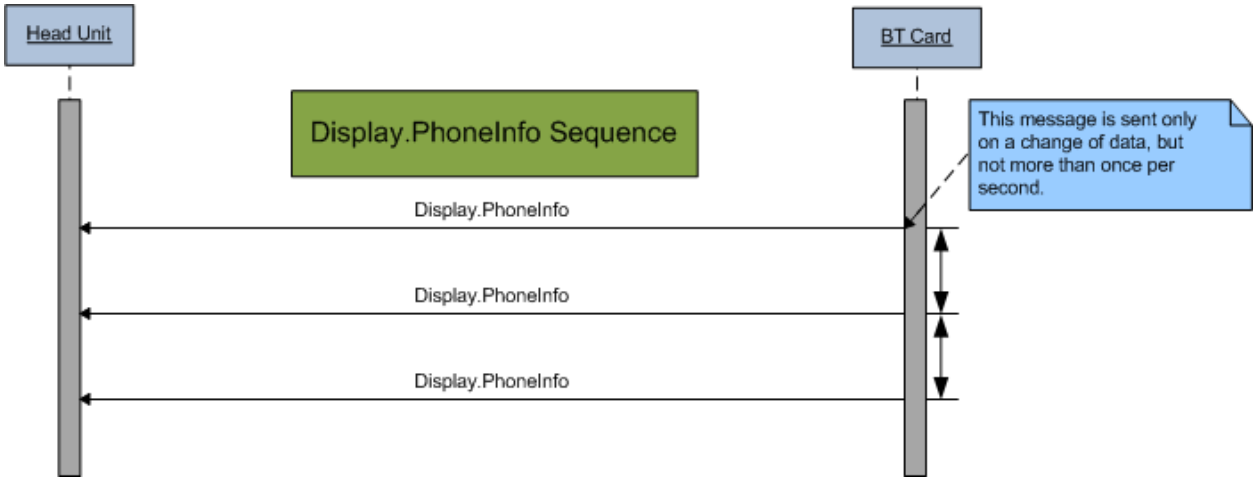
General Notes:
Button presses shall be ignored while the Language change is in progress.

5.5 Other Vehicle Message Sequences

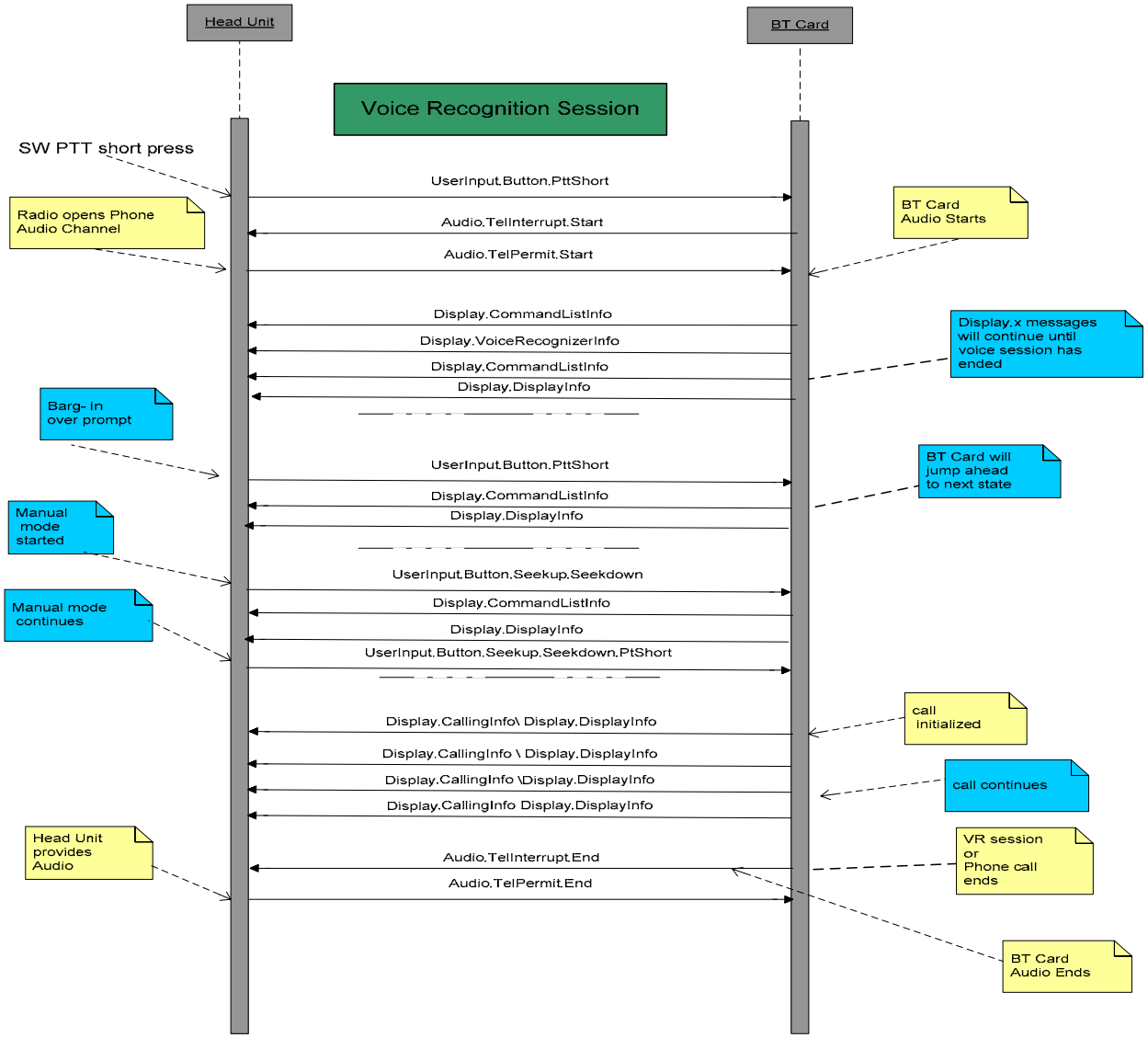


These messages are sent dynamically on a change in status asn as part of the startup sequences.

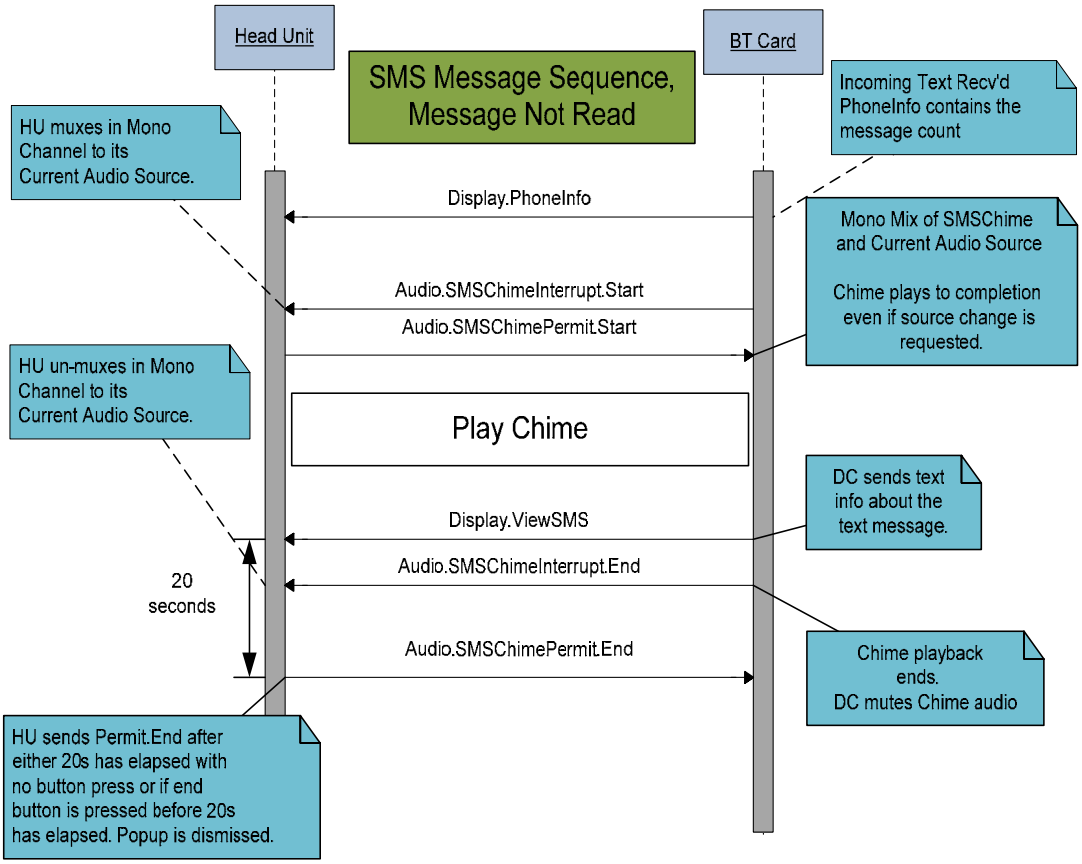
5.6 Other Vehicle Message Sequences



5.7 Voice Recognition Session Sequence

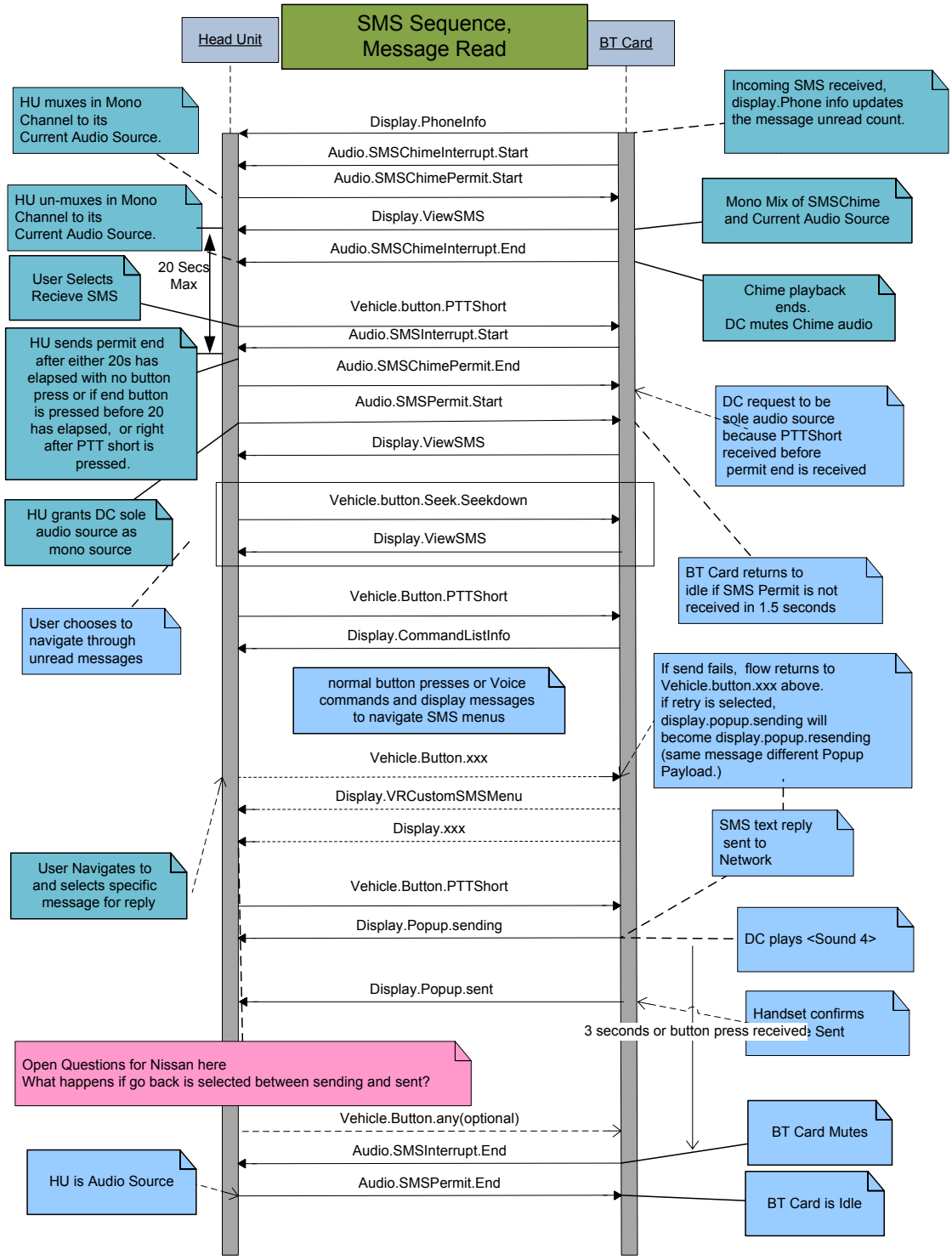


5.8 SMS Message Sequence, message not read.



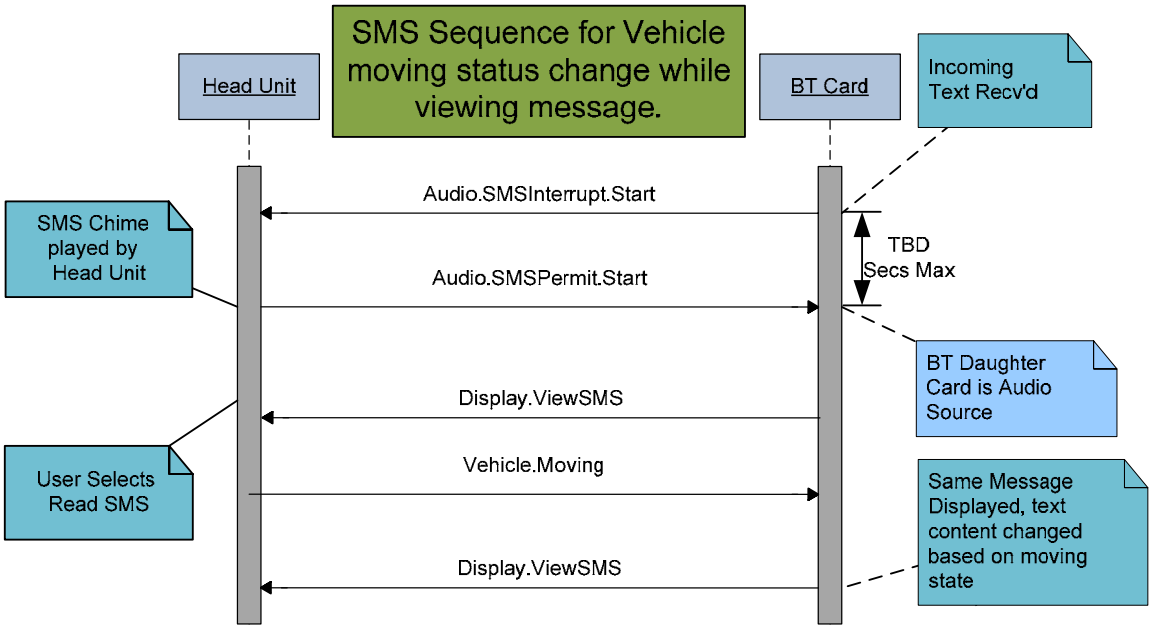
Notes:
1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

5.9 SMS Message Sequence, message read.

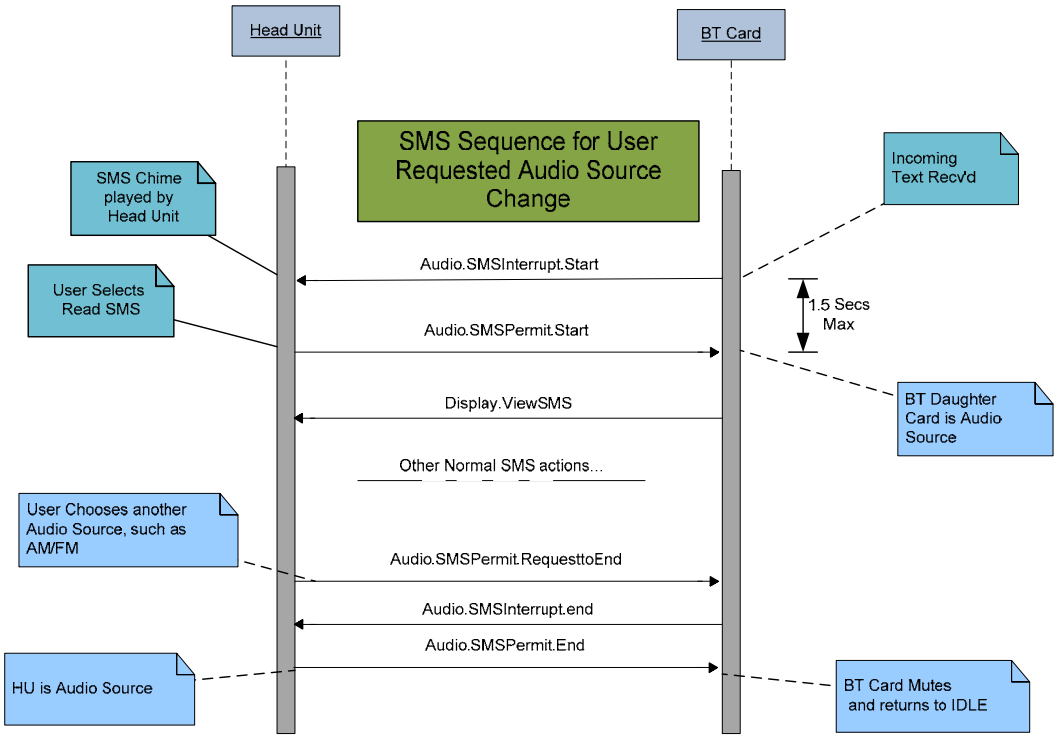


1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

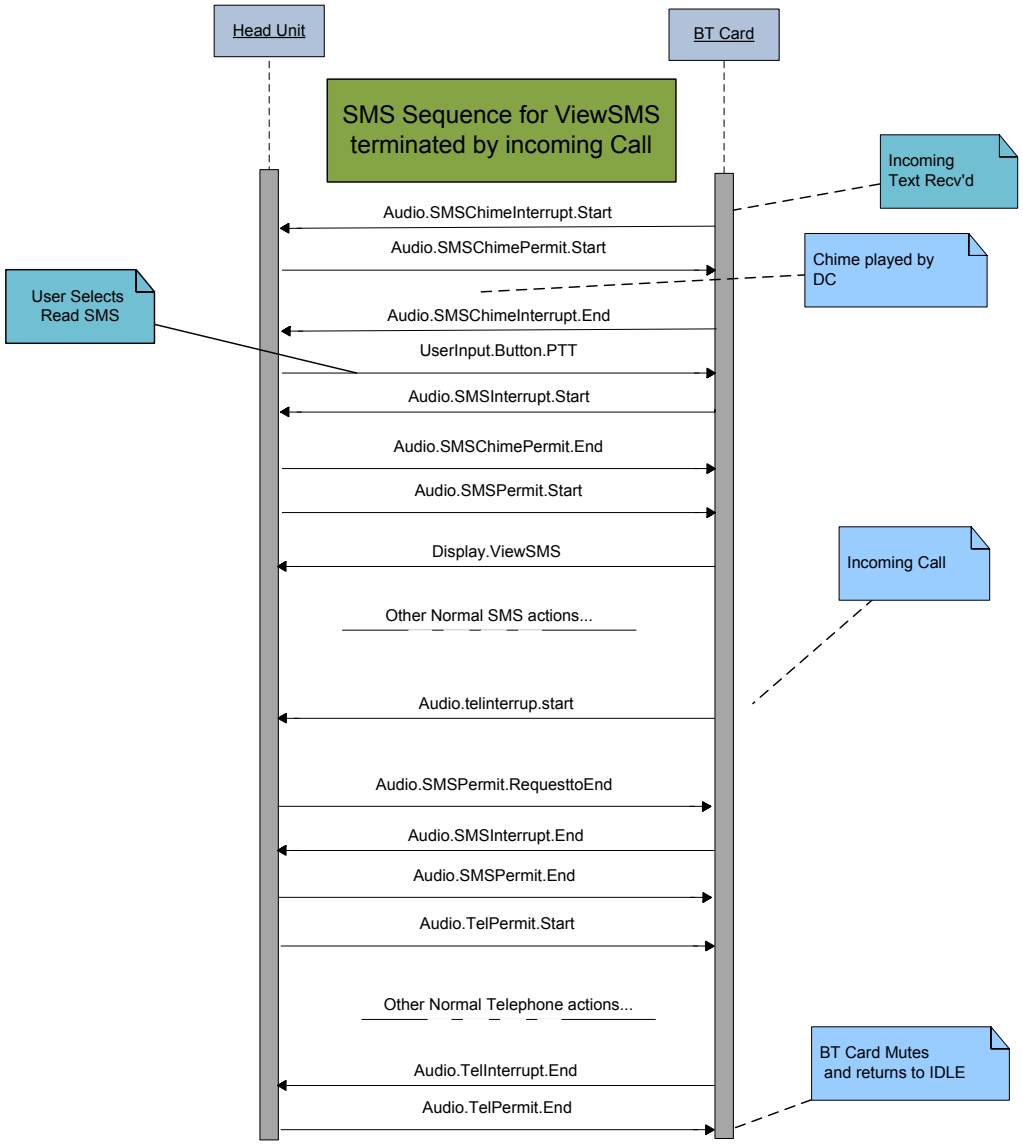
5.10 SMS Sequence when Vehicle Moving State Changes



5.11 User Cancels Read SMS by Selecting another Audio source.



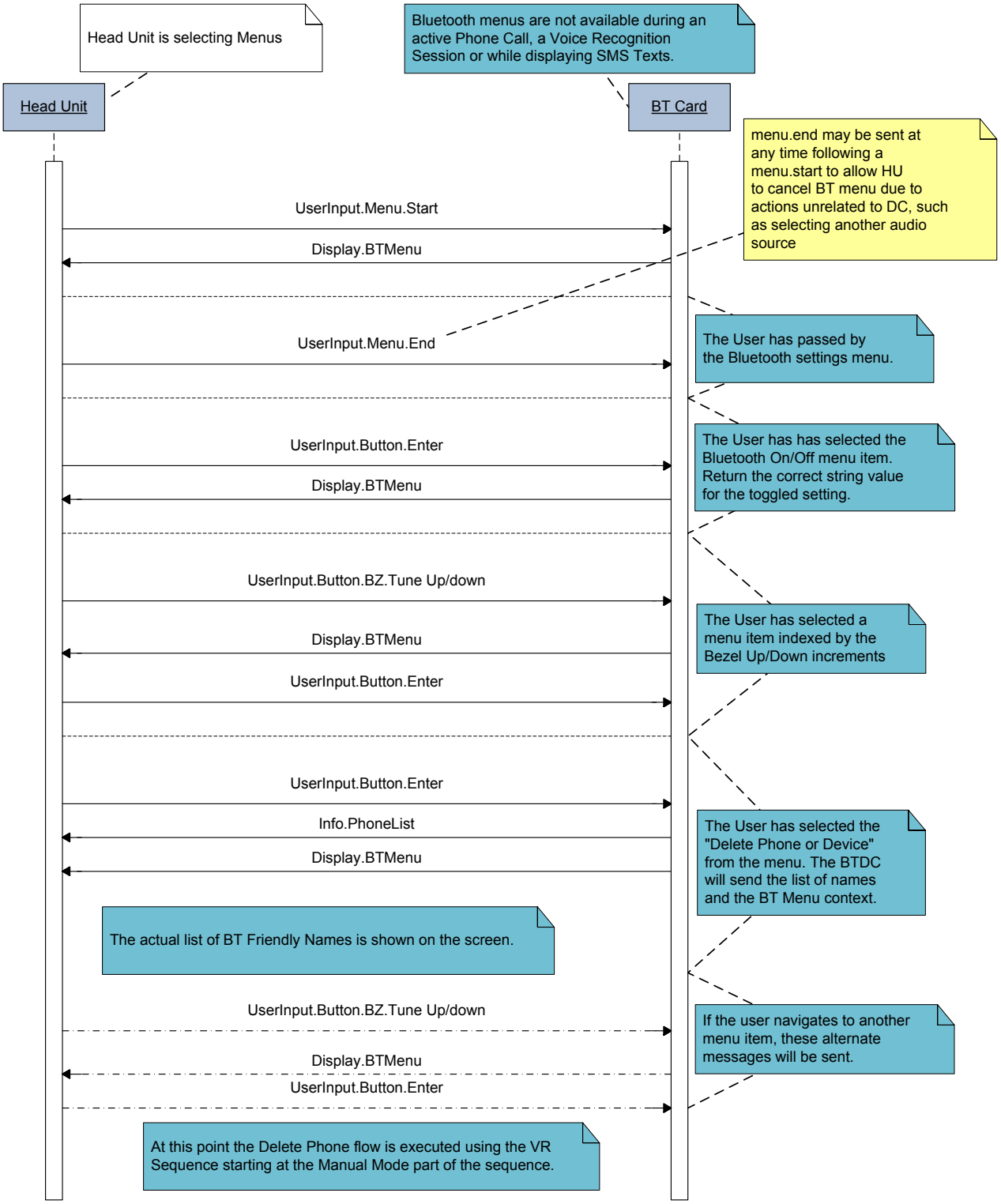
5.12 SMS Read ended by incoming Phone call.



5.13 SMS Read interrupted by User request for BT Menu

BT menu requests are ignored while reading SMS.

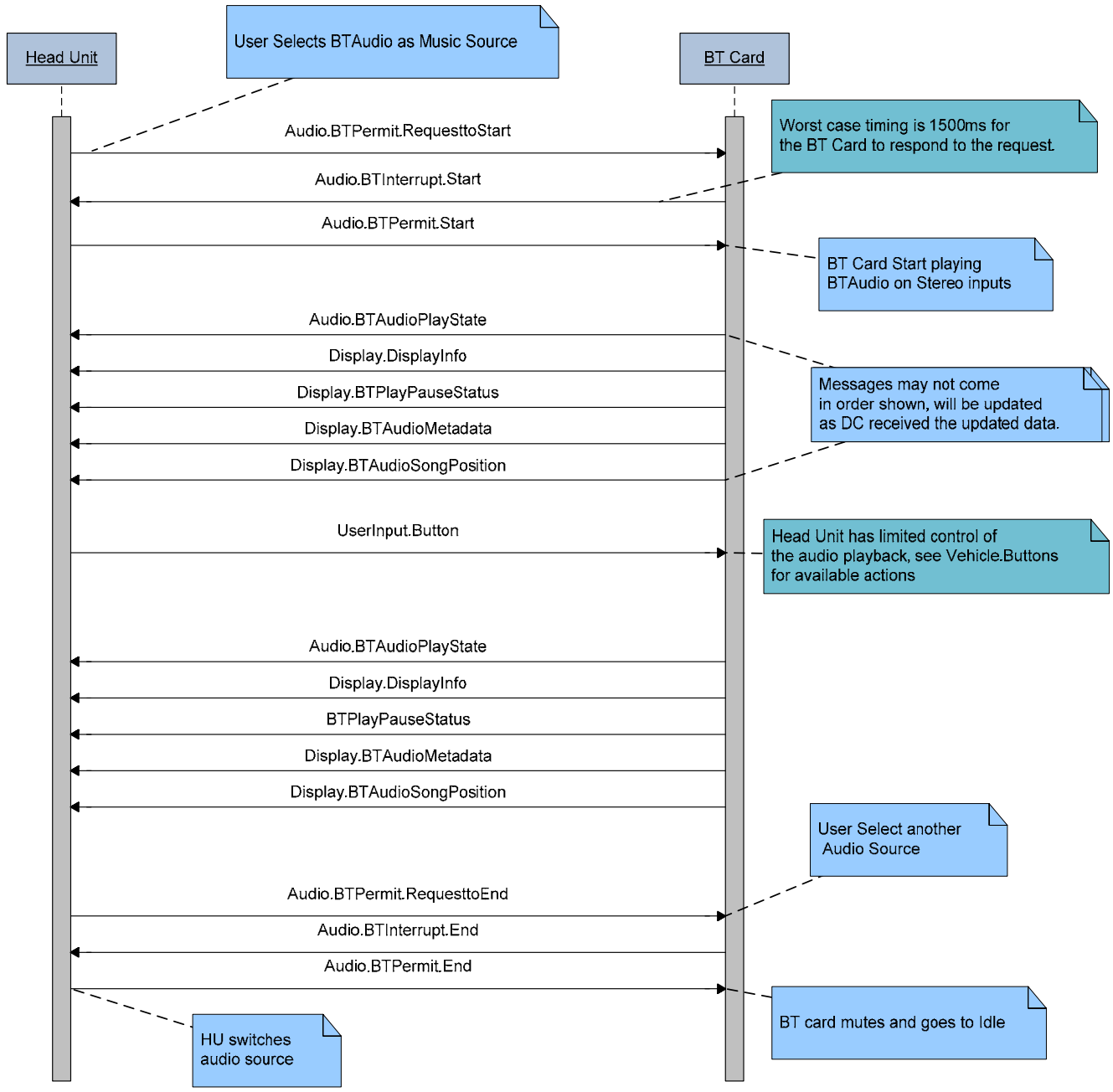
5.14 BT Menu (DA only)



5.15 BT Menu from BT audio source for 10STD audio.

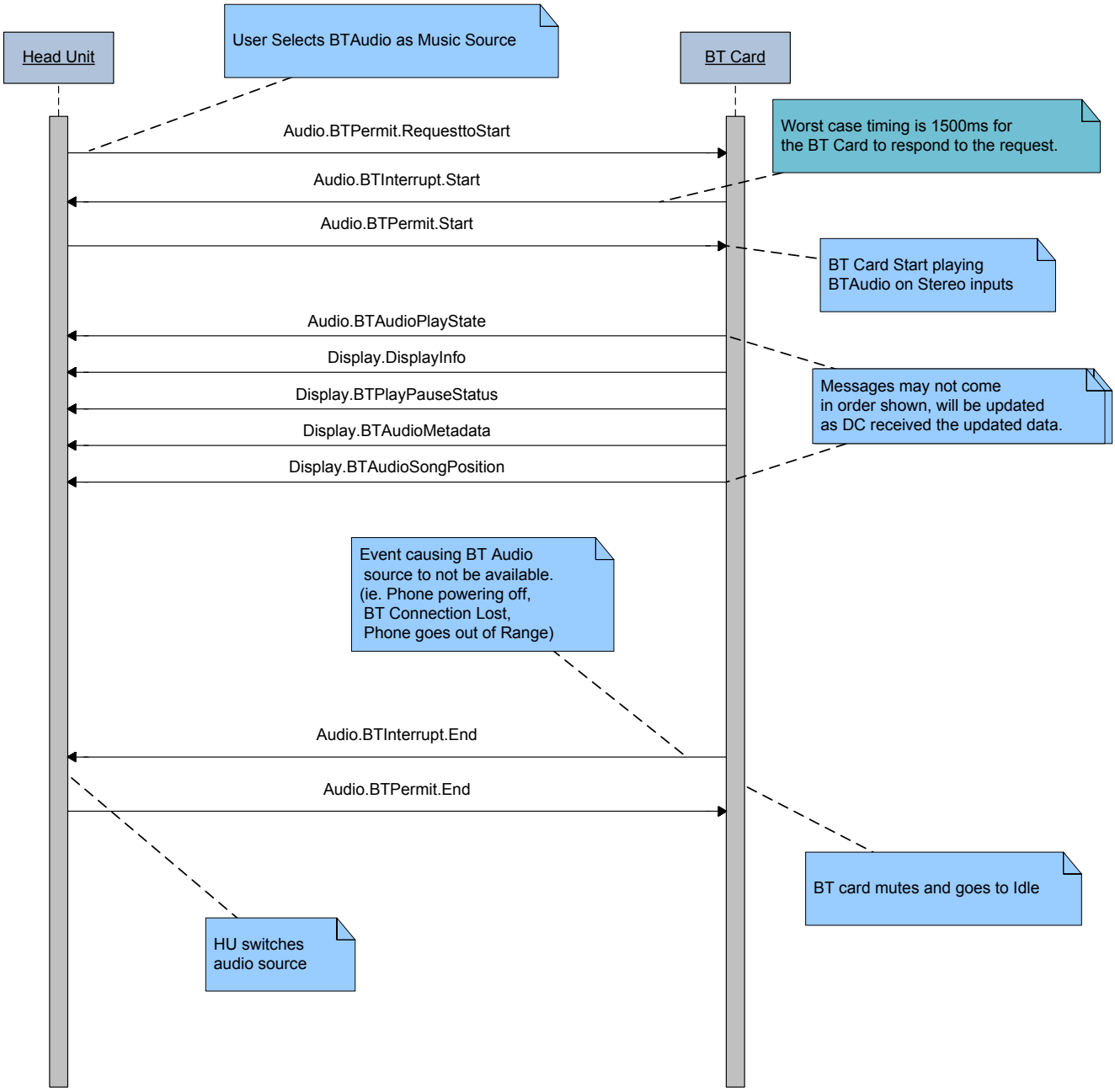
TBD, as of 4Feb2011, Nissan is having internal discussions regarding BT settings menu HMI behavior for 10STD audio.

5.16 Head Unit Requests Bluetooth Audio

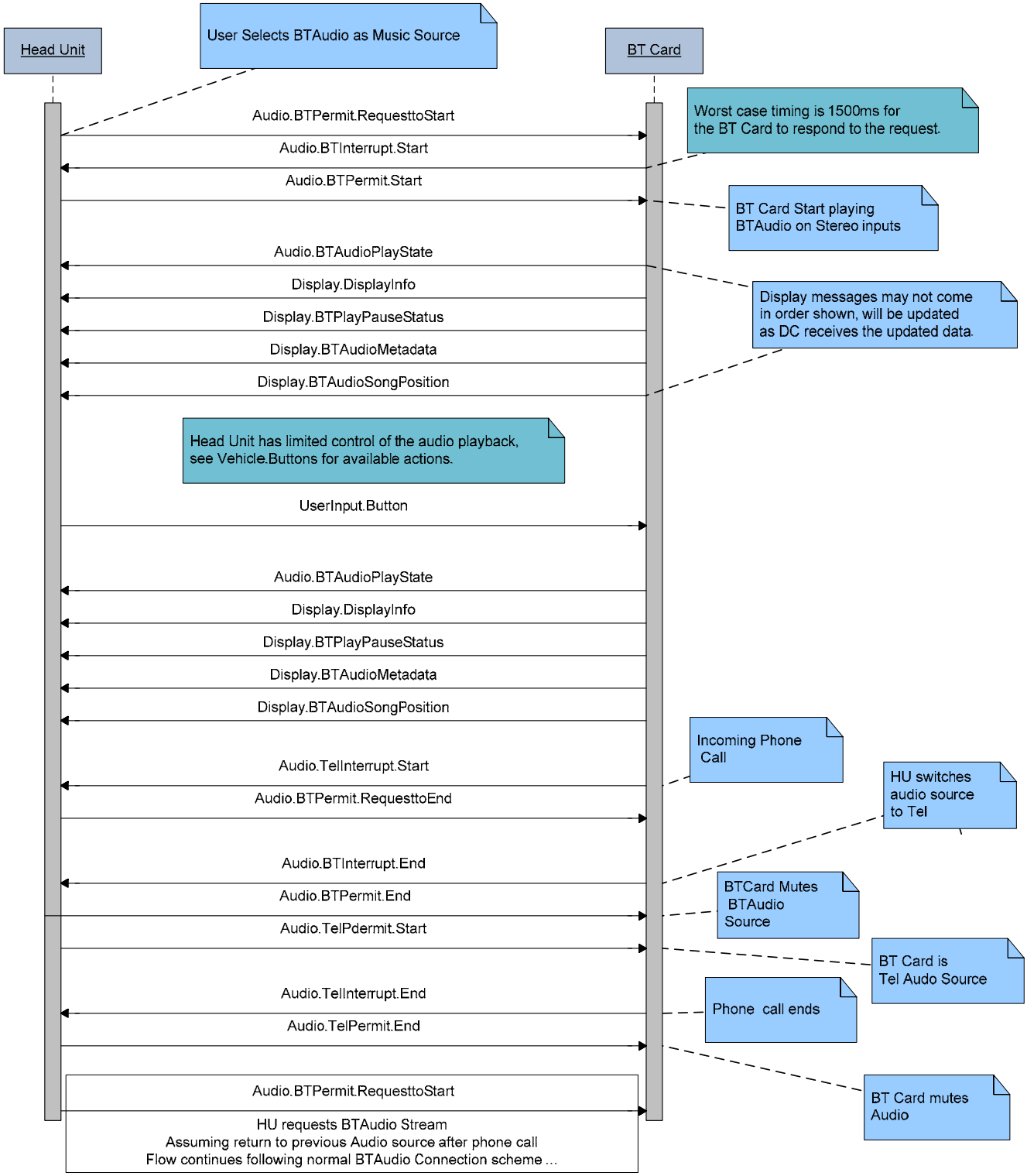


The currently active device will begin to stream audio from its local library.

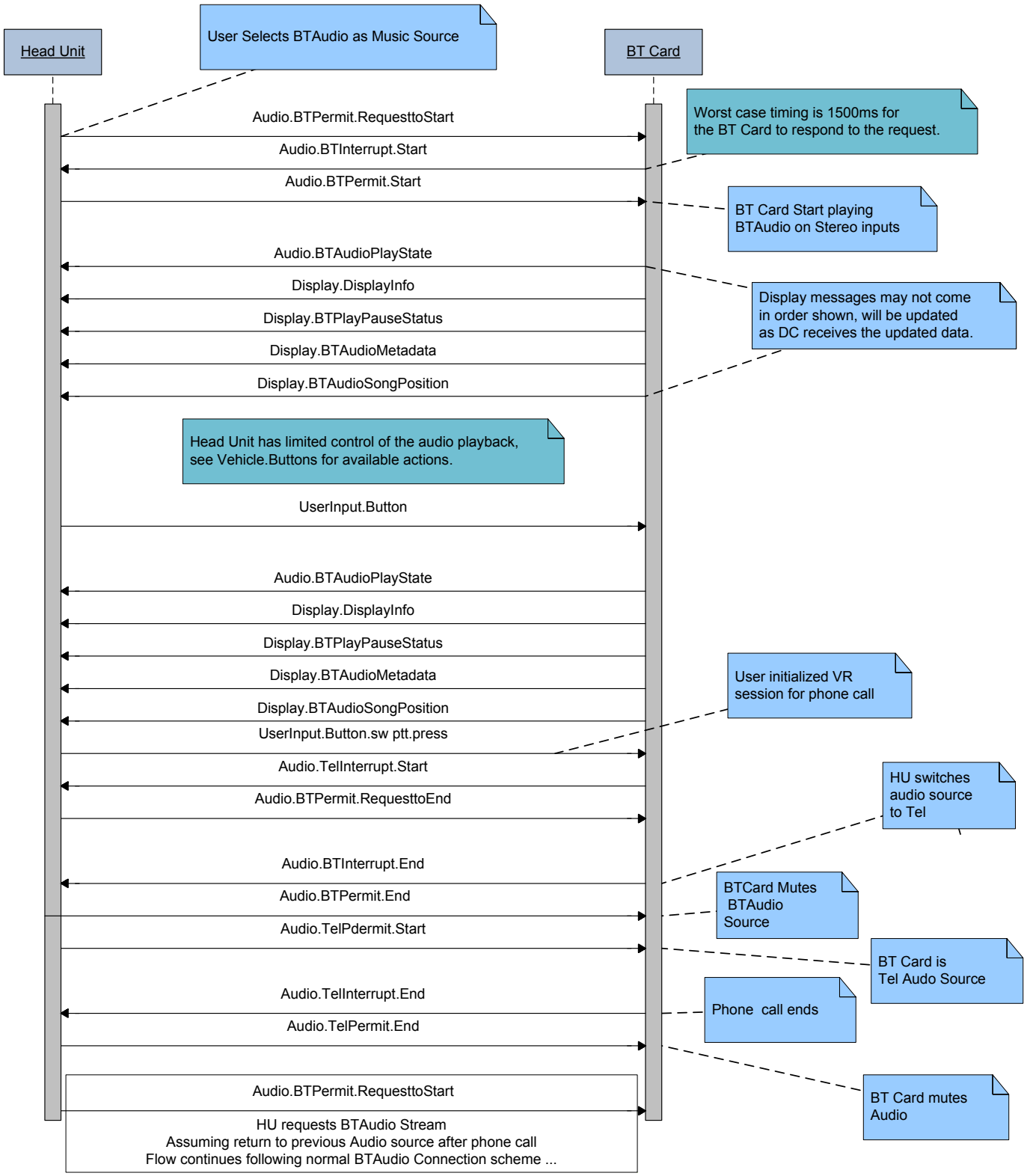
5.17 DC Ends BT Audio



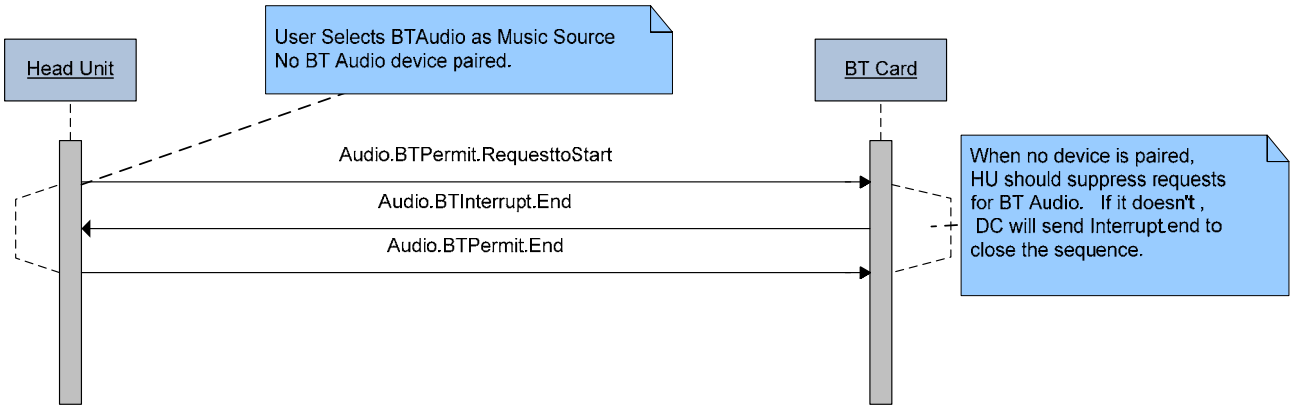
5.18 BTAudio interrupted by Phone Call



5.19 BT Audio Interrupted by PTT press to start VR session



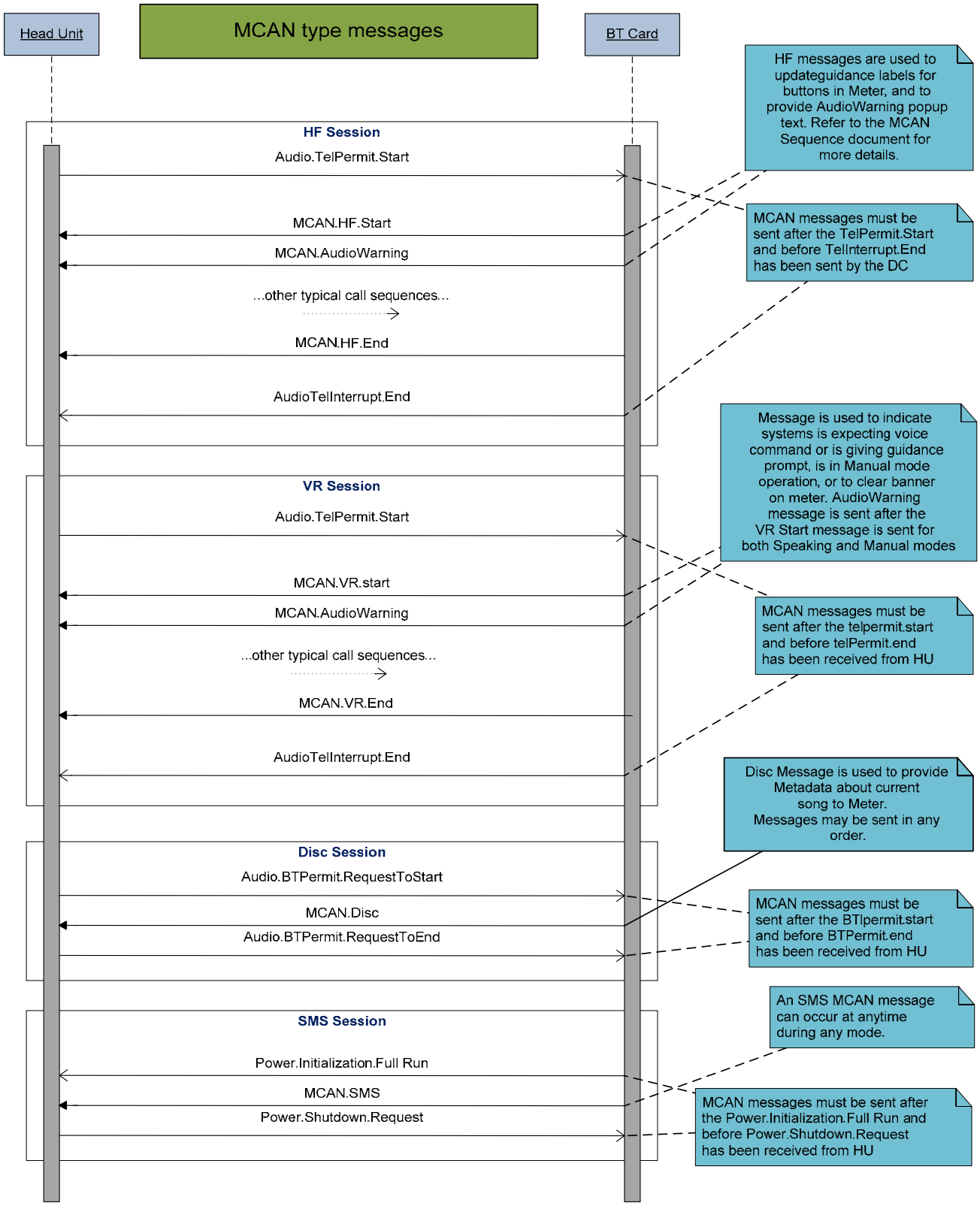
5.20 Aux mode – BT Audio mode with no BT device connected



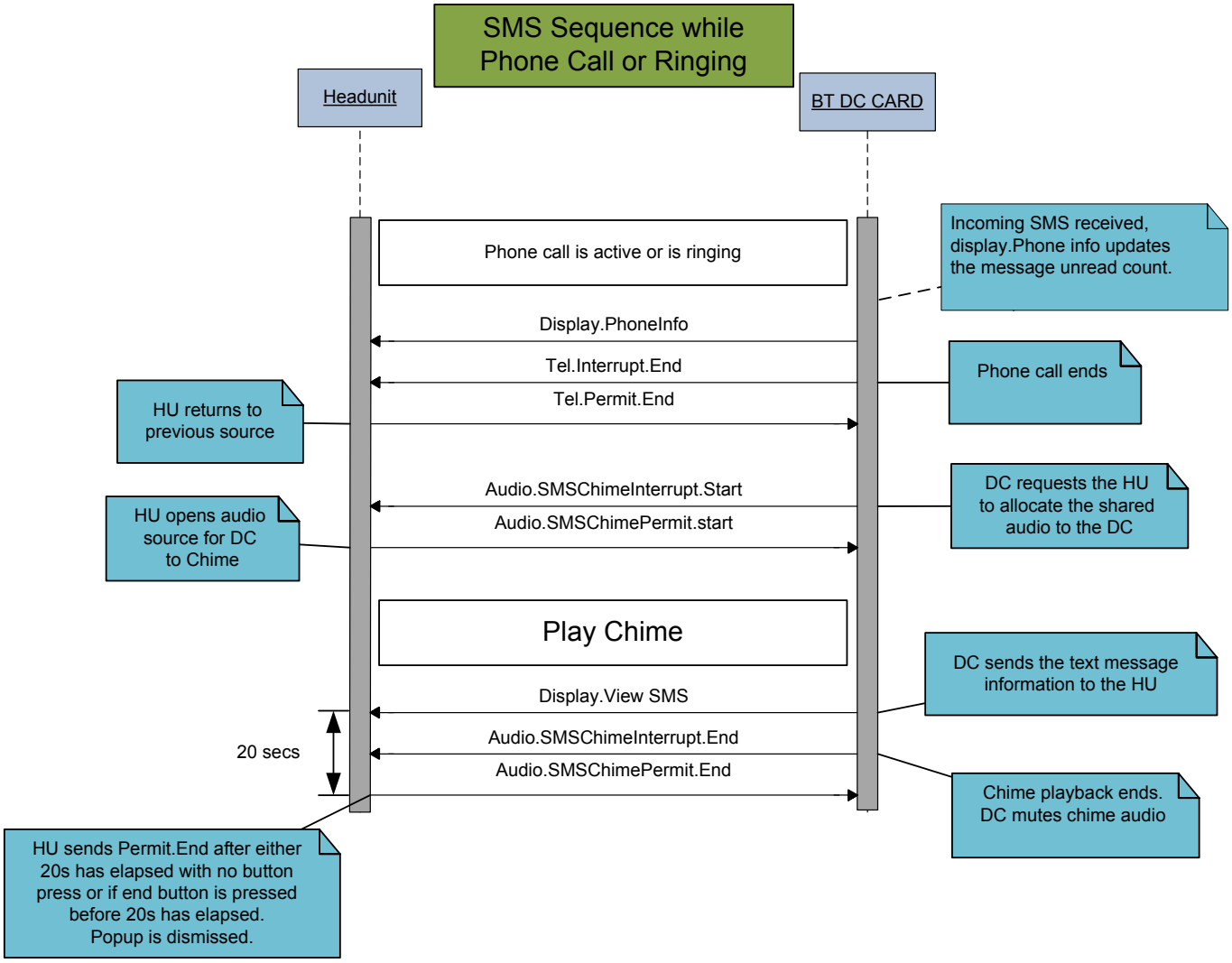
5.21 MCAN pass through messages

MCAN pass through messages may be sent by DC to HU at any time during VR, HF, SMS, BTAudio, and Menu Sequences after the respective *Permit.Start* and before the respective *Permit.End* messages have been received from the HU. The HU is responsible for receiving the message, repackaging as an MCAN message, and sending it out on the MCAN bus. No other

processing of the messages is expected.

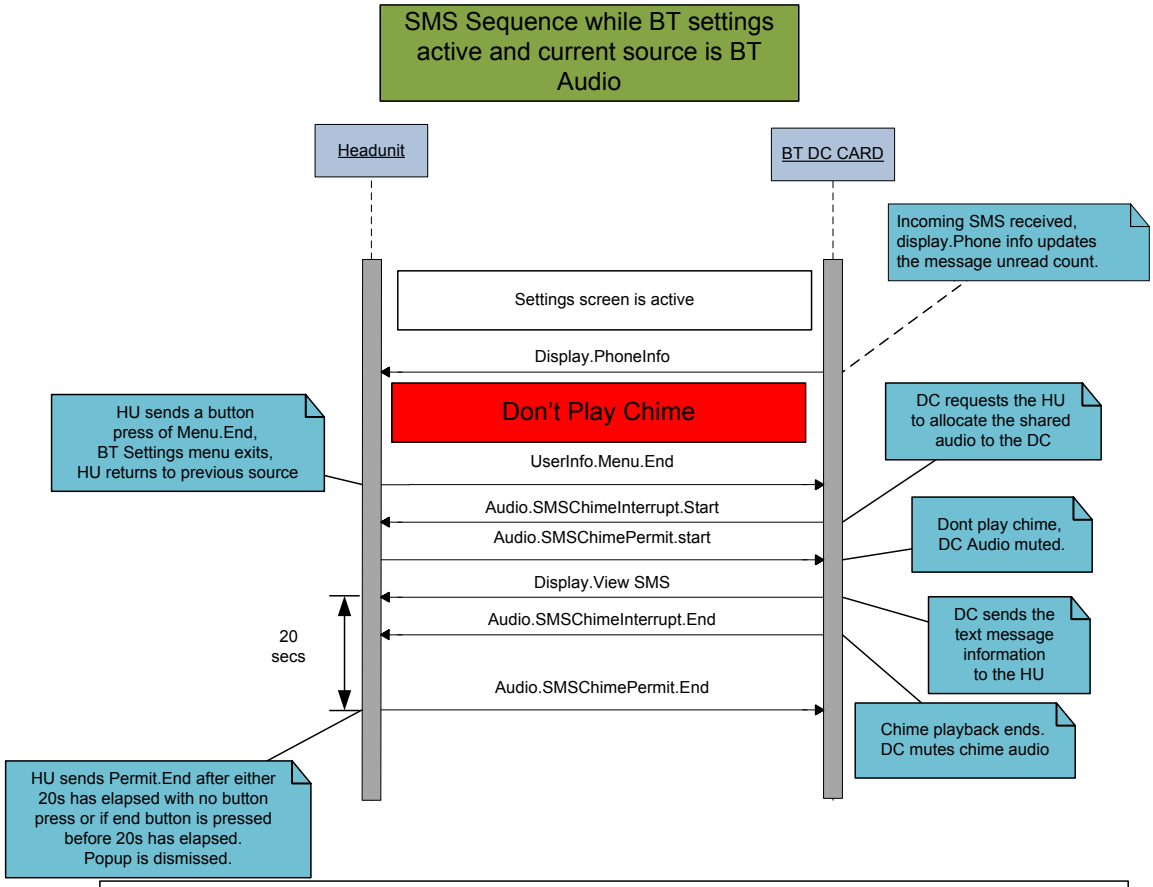


5.22 SMS Sequence wile the DC is in an Active Call



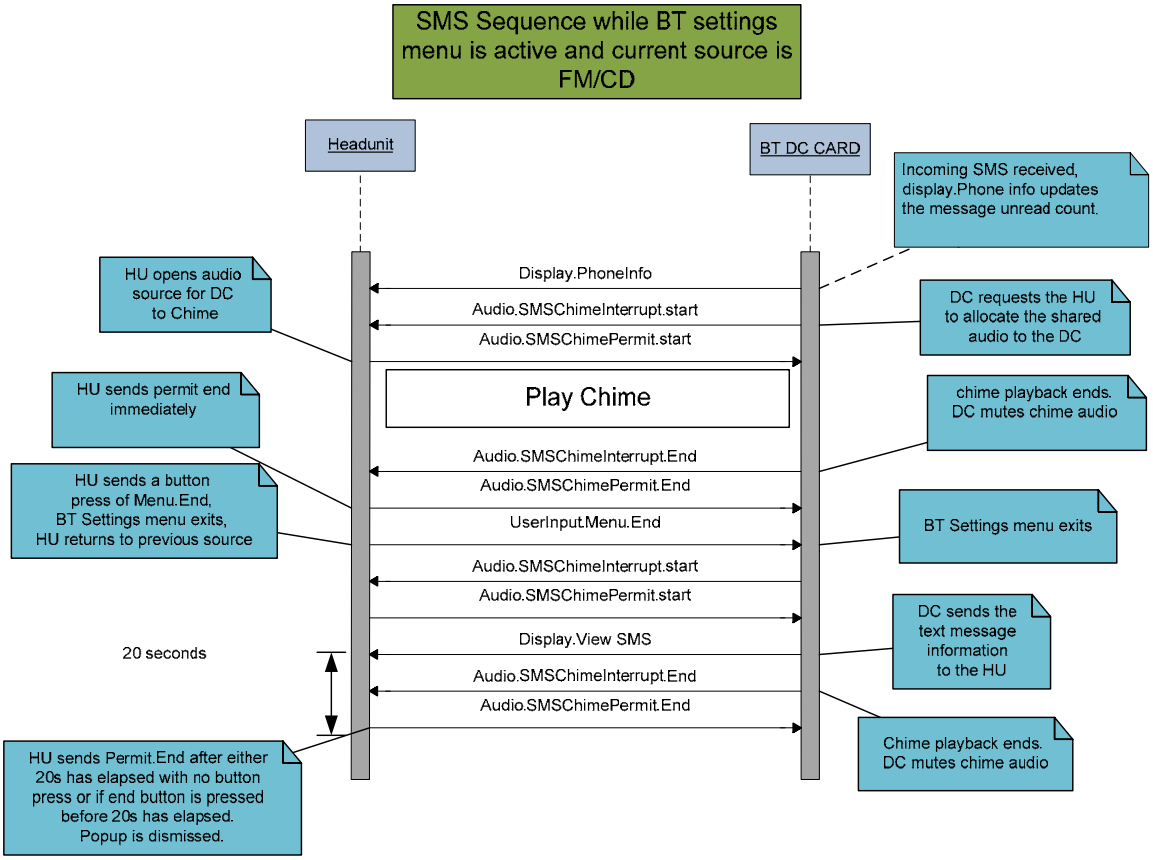
1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

5.23 SMS Sequence while the DC is in a Setting Screen and Current Source is BT Audio



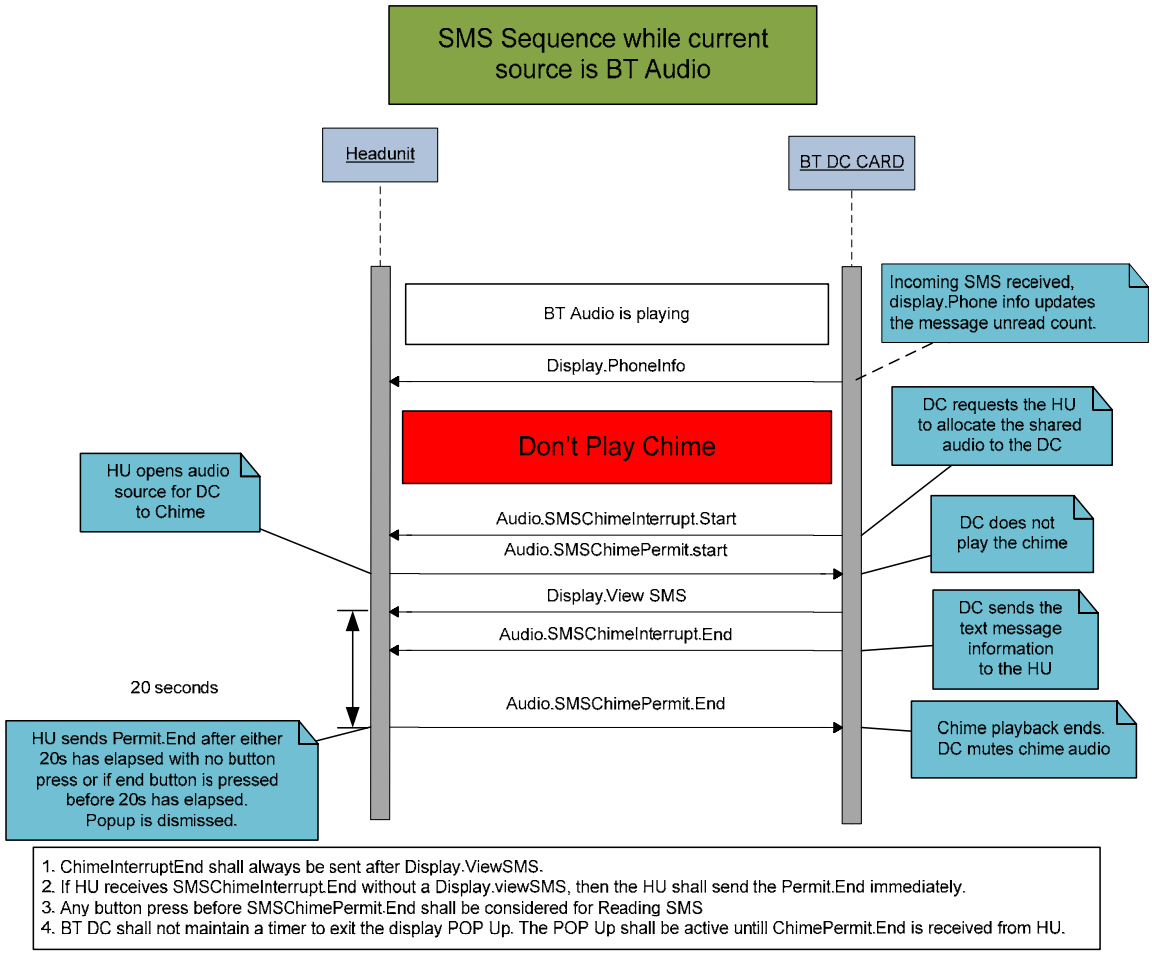
1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

5.24 SMS Sequence while the DC is in a Setting Screen and current source is FM/CD

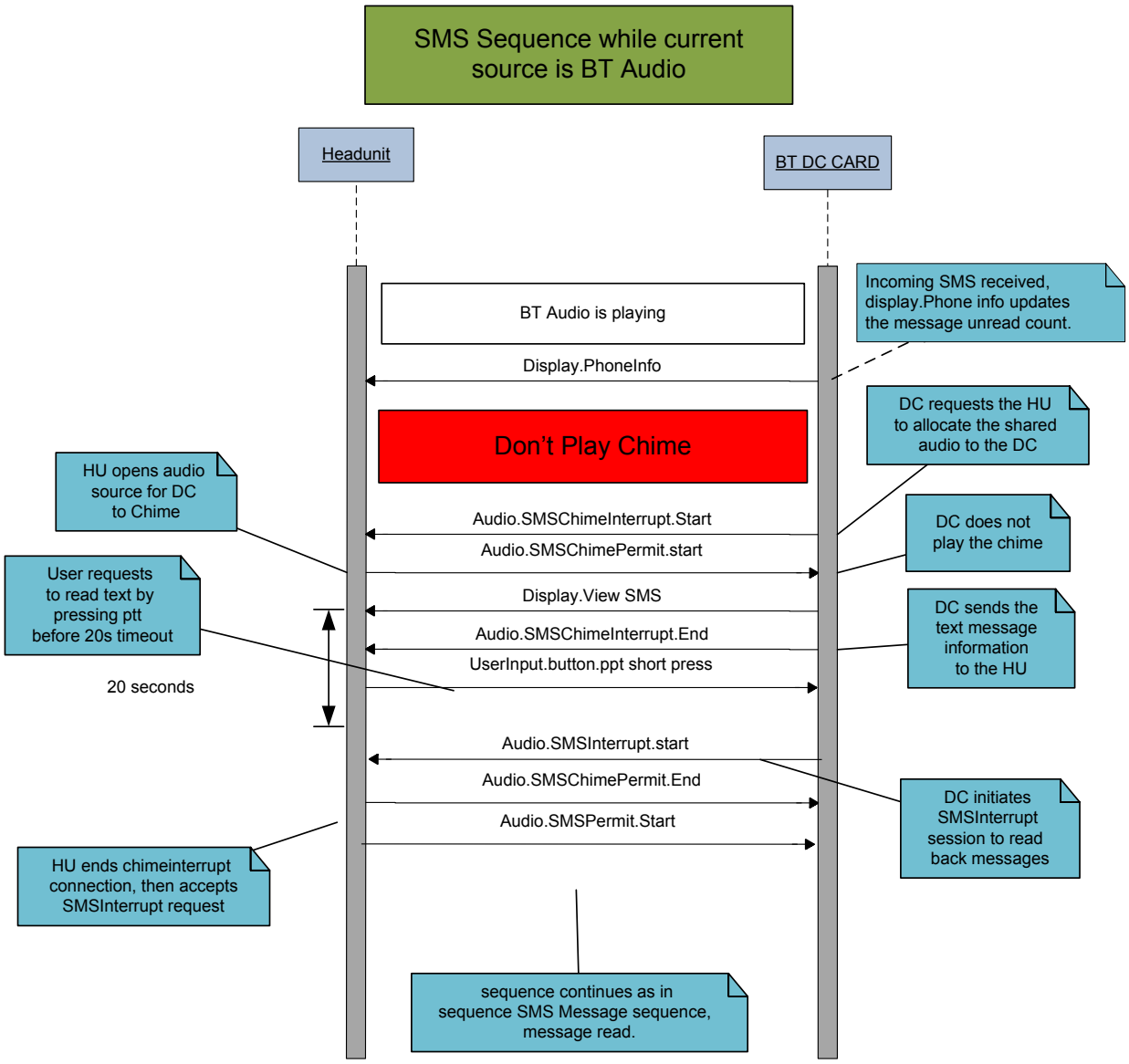


1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

5.25 SMS Received while in a BTAudio Session

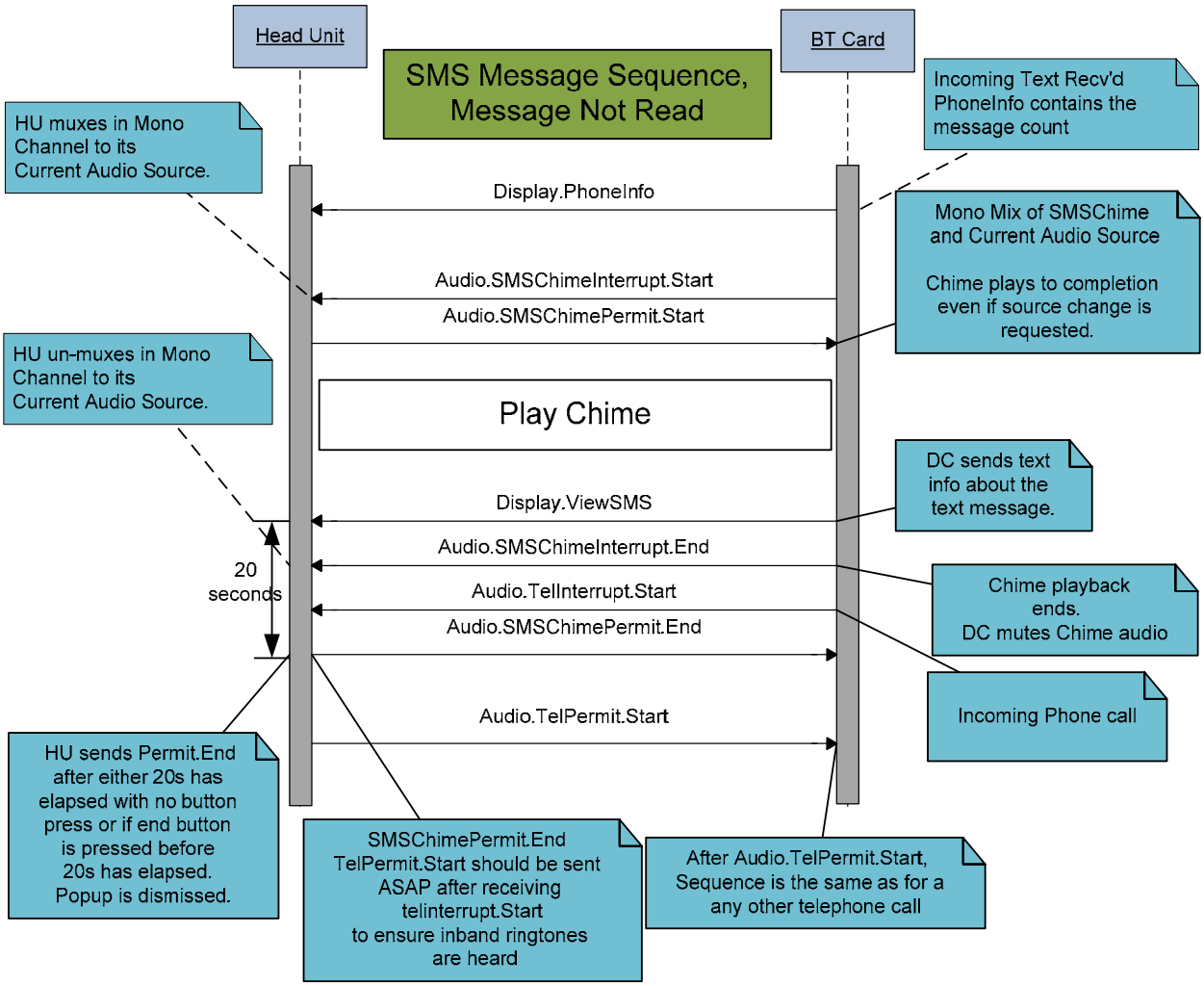


5.26 SMS Received and Read while in a BT Audio Session

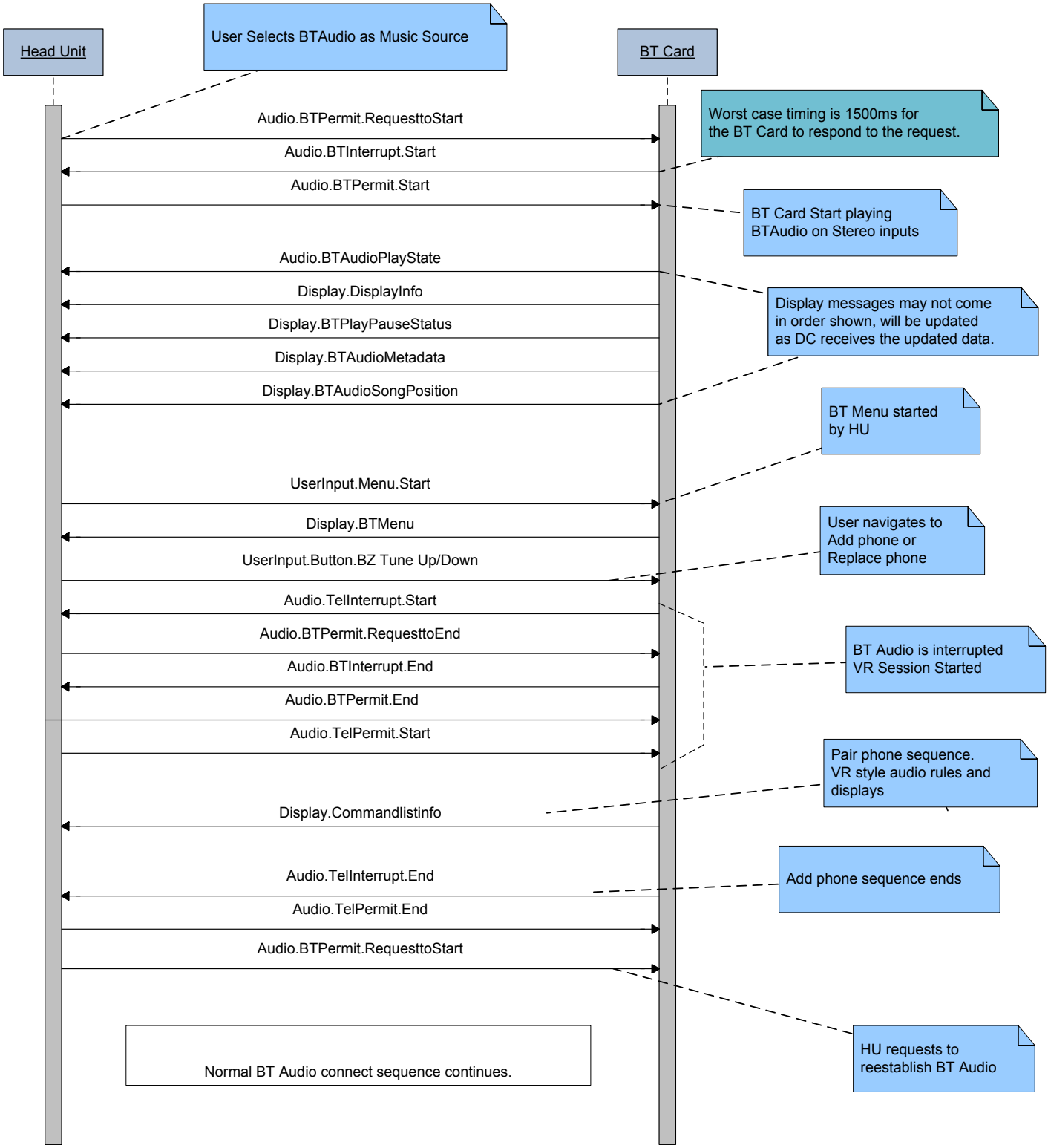


1. ChimeInterruptEnd shall always be sent after Display.ViewSMS.
2. If HU receives SMSChimeInterrupt.End without a Display.viewSMS, then the HU shall send the Permit.End immediately.
3. Any button press before SMSChimePermit.End shall be considered for Reading SMS
4. BT DC shall not maintain a timer to exit the display POP Up. The POP Up shall be active untill ChimePermit.End is received from HU.

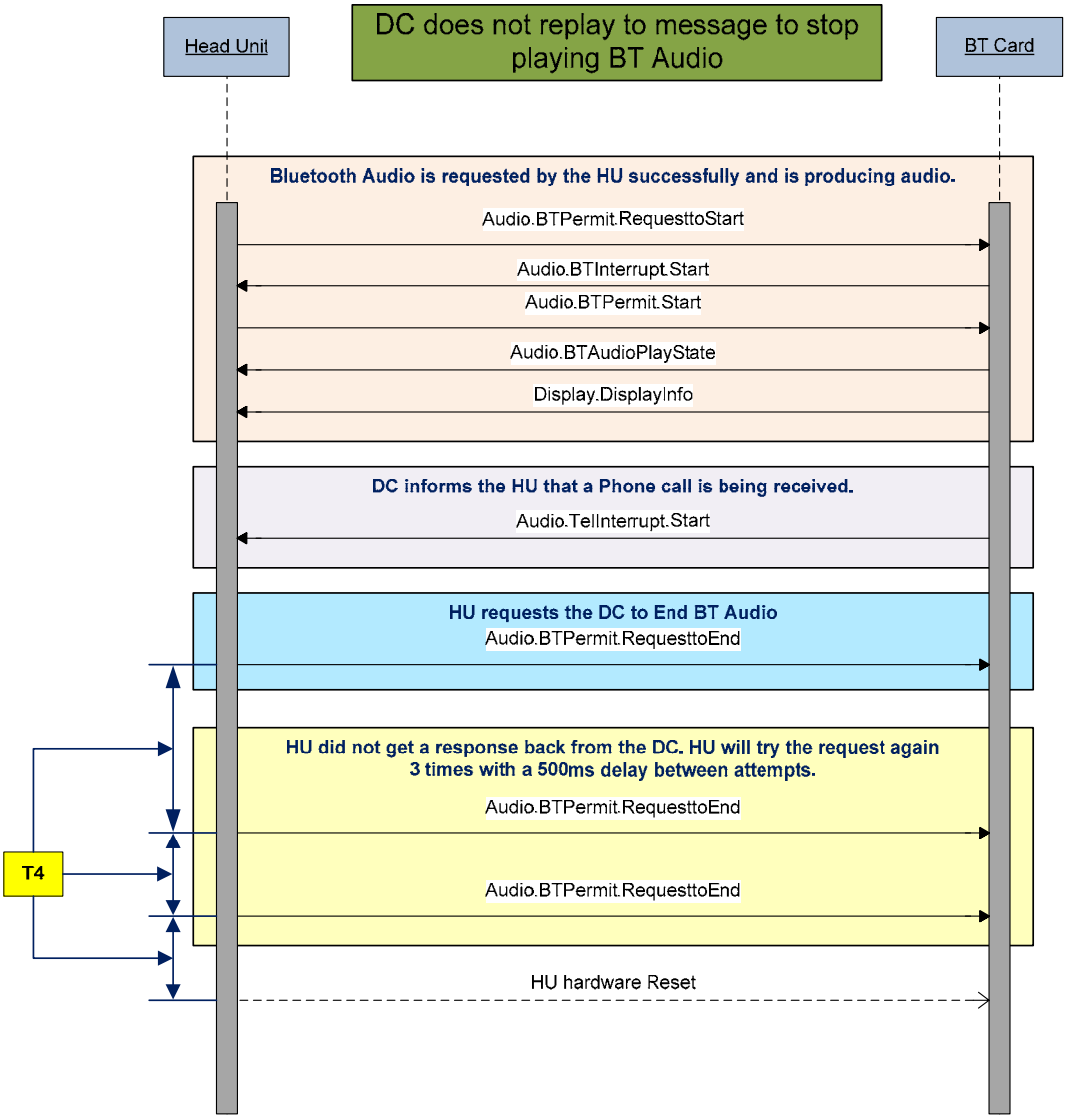
5.27 SMS Message Sequence,end interrupted by phone call



5.28 BT Audio to VR session Via BT Menu



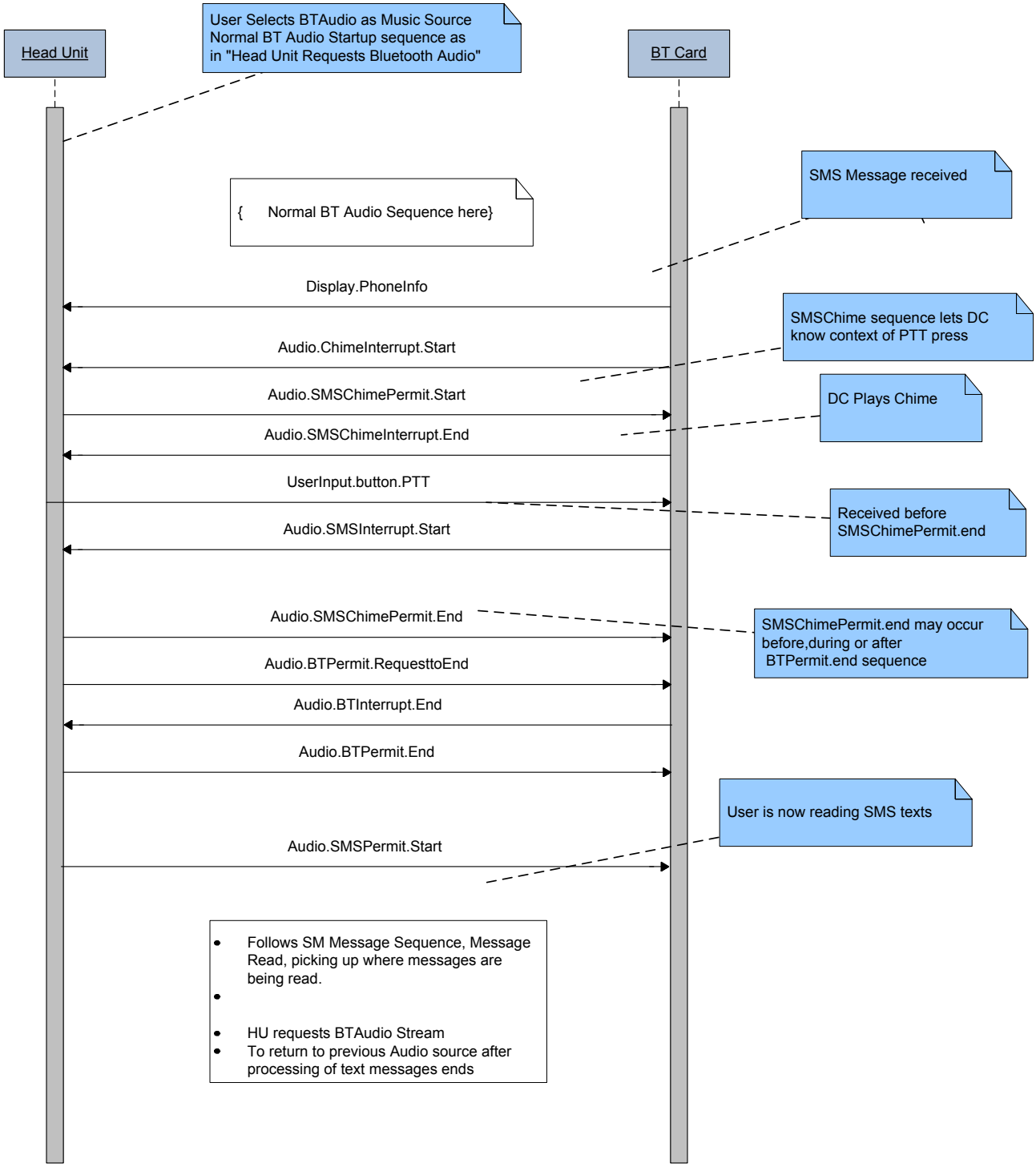
5.29 DC does not reply to message to stop playing BT Audio



If the DC does not respond to RequestToEnd within 500ms, the HU will attempt to solicit a response from the DC two more times. This allows the DC 1500ms in total to respond to the request from the HU to end the Bluetooth Audio session. If the DC does not respond within the time allowed, the HU will reset the DC.

T4 = $T_{BTInterruptEndMessageRetryTime}$ = 500 ms.

5.30 BT Audio Interrupted by SMS



6 Message Details

6.1 Message types and Categories

Message type and Category shall be used as the command byte in the NBUS message.

Message Types	**Message Categories**	**Description**	**Used in DA** x means used	**Used in Standard** x means used	**Appears in sw version and later**
0x01	Not Used				
0x02 – Power	0x01 – Initialization	Messages related to Initialization Sequence.	x	X	2.3.0
	0x02 – Shutdown	Messages related to Shutdown Sequence.	x	X	2.3.0
	0x03 – Request for Reset	Indicates to the Head Unit that DC is requesting to perform a reset of itself.	x	X	2.3.0
0x03 - Audio	0x01 – Tel_Interrupt	Indicates the message is for requesting and releasing Audio resource from HU.	x	X	2.3.0
	0x02 – Tel_Permit	Indicates the message is for responding to DC with request and release of Audio Resource from HU.	x	X	2.3.0
	0x03 – BTInterrupt	Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a BlueTooth audio session	x	x	2.3.0
	0x04 – BTPermit	Message used to indicate to the Daughter Card for successful allocation and Deallocation of Audio Resource	X	x	2.3.0
	0x05 – SMSInterrupt	Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a Display.ViewSMS message with text	X		2.3.0

Message Types	Message Categories	Description	Used in DA x means used	Used in Standard x means used	Appears in sw version and later
	0x06 – SMSPermit	Message used to indicate to the Daughter Card for successful allocation and Deallocation of Audio Resource	X		2.3.0
	0x07 -- SMSChimeInterrupt	Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a Mixed Chime	X		2.3.0
	0x08 - SMSChimePermit	Message used to indicate to the Daughter Card for successful allocation and Deallocation of Audio Resource	X		2.3.0
0x04 - Display	0x01 – Phone Info	Displays the Network Level and Battery Signal Level.	X	x	2.3.0
	0x02 – VoiceRecognizerInfo	Displays the command which has been recognized in a VR Session.	X		2.3.0
	0x03 – Command List Info	To notify HU of the Command List Screen.	X		2.3.0
	0x04 – PopUp Info	To notify HU of the PopUp Info Screen.	x		2.3.0
	0x05 – Calling Info	To notify HU of the Calling Info Screen.	x		2.3.0
	0x06 – DisplayInfo	To notify 1 line display HU for the necessary Display Contents.		x	2.3.0
	0x07 – ViewSMS	To send the contents of the SMS message.	x		2.3.0
	0x08 - BTAudioMenu	To display BTAudio menu items	Not used	Not used	2.3.0
	0x0A – BTAudioMetadata	Provide metadata for the current track for display	x		2.3.0
	0x0B – BTAudioSongPosition	To provide current position of the playing song.	x		2.3.0
	0x0C – BTMenu (Phone Settings)	To notify the HU of the Command List Information.	x		2.3.0

Message Types	Message Categories	Description	Used in DA x means used	Used in Standard x means used	Appears in sw version and later
	0x0D – VRCustomSMSMenu	To notify the HU of the command list information	x		2.3.0
	0x0E- BTAudioPlayState	To notify HU of Repeat and Rnd status for BT audio source	x	x	2.3.0
	0x0F – PlayPauseStatus	To notify the HU of the status of Play and Pause.	x	x	3.01
0x05 Not Used					
0x06 – Info	~~0x01 – PhoneList.Request~~	~~The Head Unit needs a list of the currently paired phones.~~			2.3.0
	~~0x02 – CustomSMSList.Request~~	~~The Head Unit needs a list of the currently saved Custom SMS reply messages~~			2.3.0
	0x03 – CustomMessageSelection	To notify the HU of the Command List Information. This populates the special command list values for custom message text menu.	x		2.3.0
	0x04 – PhoneList	Provides paired phones and the types. This populates the command list values for the phone list text menu	x		2.3.0
	0x05 – SavedMSG	To notify the HU of the Custom message text Information. Each one of these strings will be associated with a fixed ID that can be found in the Voice Prompts spec.	x		2.3.0
0x07 – HeartBeat	0x01 – BTCARD	BT Daughter Card current status sent at a cyclic rate of specified by previous HB message.	x	x	2.3.0
	0x02 – HeadUnit	The Head Unit current status sent at a cyclic rate specified by previous HB message.	x	x	2.3.0

Message Types	Message Categories	Description	Used in DA x means used	Used in Standard x means used	Appears in sw version and later
0x08 – Vehicle IO	0x01 – Configuration	Indicates the message is for setting the Vehicle Pin Configuration.	x	x	2.3.0
	0x02 – Language	Indicates the message is for setting the new Language Change.	x		2.3.0
	0x04– Vehicle_Moving	Vehicle moving or Vehicle Stationary	x	x	2.3.0
	0x05 – Vehicle TopDown	Convertible to open or Closed	x	x	2.3.0
0x09 – Diagnostics	0x01 –RXFromTester	A diagnostic request received from the Head Unit or tester	x	x	2.3.0
	0x02 –TXToTester	A diagnostic reply to the Head Unit or tester	x	x	2.3.0
0x0A – UserInput	0x01 – Button	Indicating the button pressed.	x	x	2.3.0
	0x02 – Menu	A BT menu context is Started or Ended	x	TBD. Nissan studying menu operation	2.3.0
0x0B - MCAN	0x01 - AudioWarning	Used to indicate External Sound when HF call is in progress	x	x	2.3.0
	0x02 – HF	Used to indicate start and end of HF call	x	x	2.3.0
	0x03 – SMS	Used for conveying SMS_Info and SMS_Menu parameters	x		2.3.0
	0x04 VR	Used for conveying VR_Info parameters	x	x	2.3.0
	0x05 Disc	Used for conveying interrupt, Disc source, track, group and artist parameters	x	x	2.3.0
0x0C – ProgramRequest	Please see the specification called Procedure for the Bluetooth Daughter card Programming via NBUS" for a complete and up to date version of these messages.		x	x	2.4.1
0x0D – ProgramResponse			x	x	2.4.1
0x0E	Not Used				
0x0F	Not Used				

6.2 Message Set

6.2.1 Audio Arbitration Message Set

6.2.1.1 Audio.TelInterrupt

Transmitter: BT Daughter Card

Description: Message used to request for Allocation and Deallocation of Audio Resource from HU.

Byte	Field		Val	Description
0	Type	Category	0x31	3 - Audio Message Type 1 - Tel Interrupt Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – End

6.2.1.2 Audio.TelPermit

Transmitter: Head Unit

Description: Message used to indicate to the BT Card for successful allocation and Deallocation of Audio Resource.

Byte	Field		Val	Description
0	Type	Category	0x32	3 - Audio Message Type 2 - Tel Permit Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – End

Note: When Audio is granted using TelPermit, it shall be connected as a mono source

6.2.1.3 Audio.BTInterrupt

Transmitter: BTCard

Description: Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a BlueTooth audio session

Byte	Field		Val	Description
0	Type	Category	0x33	3 - Audio Message Type 3 – BT Interrupt Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – Stop

6.2.1.4 Audio.BTPermit

Transmitter: Head Unit

Description: Message used to indicate to the BT Card for successful allocation and Deallocation of Audio Resource

Byte	Field		Val	Description
0	Type	Category	0x34	3 - Audio Message Type 4 – BT Permit Audio Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – Stop 0x03 – Request to start 0x04 – Request to end

Note: When Audio is connected using BT permit, it shall be connected as a Stereo Source.

6.2.1.5 Audio.SMSInterrupt

Transmitter: BT Card

Description: Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a Display.ReadSMS message with text

Byte	Field		Val	Description
0	Type	Category	0x35	3 - Audio Message Type 5 – SMS Interrupt Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – End

6.2.1.6 Audio.SMSPermit

Transmitter: Head Unit

Description: Message used to indicate to the BT Card for successful allocation and deallocation of Audio Resource

Byte	Field		Val	Description
0	Type	Category	0x36	3 - Audio Message Type 6 - SMS Permit Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – End 0x03 – Request to Start 0x04 – Request to End

- When Audio is connected using SMSPermit, it shall be connected as a Mono source.

6.2.1.7 Audio.SMSChimeInterrupt

Transmitter: BTCard

Description: Message used to request for Allocation and Deallocation of Audio Resource from HU with the HU preparing for a SMSChime session

Byte	Field		Val	Description
0	Type	Category	0x37	3 - Audio Message Type 7 – SMSChimeInterrupt Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – Stop

6.2.1.8 Audio.SMSChimePermit

Transmitter: HU

Description: Message used to indicate to the BT Card for successful allocation and deallocation of Audio Resource.

Byte	Field		Val	Description
0	Type	Category	0x38	3 - Audio Message Type 8 – BT Interrupt Category
1	Data		-	Bit masks defined as follows: 0x01 – Start 0x02 – Stop

6.2.2 Power Message Set

6.2.2.1 Power.Initialization

Transmitter: BT Daughter Card

Description: Message to indicate to the HU the initialization status of the Daughter Card.

Byte	Field		Val	Description
0	Type	Category	0x21	2 - Power Message 1 - Initialization Request Category
1	Data		-	Bit masks defined as follows: 0x01 – Init Complete – DC has initialized and is ready for UART Communication. (note: not used) 0x03 – Full Run – DC has completely initialized and is ready to accept button pressed.

6.2.2.2 Power.Shutdown.Request

Transmitter: Head Unit

Description: Message used to indicate to BT Card that it needs to shutdown.

Byte	Field		Val	Description
0	Type	Category	0x22	2 - Power Message Type 2 - Shutdown Category
1	Data		0x01	Bit masks defined as follows: 0x01 – Request

6.2.2.3 Power.Shutdown.Response

Transmitter: BT Daughter Card

Description: Response message for Shutdown request from HU.

Byte	Field		Val	Description
0	Type	Category	0x22	2 - Power Message Type 2 - Shutdown Category
1	Data		-	Bit masks defined as follows: 0x02 – Shutdown In Progress 0x03 – Shutdown Complete 0x04 – Shutdown Pending

6.2.2.4 Power.RequestForReset

Transmitter: DC

Description: Message indicating DC is requesting that the HU reset the DC by asserting the reset line.

Byte	Field		Val	Description
0	Type	Category	0x23	2 – Power Message Type 3 – RequestforReset Category

6.2.3 Vehicle Message Set

6.2.3.1 Vehicle.Config.Get

Transmitter: BT Daughter Card

Description: Message requesting for Vehicle Pin Configuration, Head Unit Id.

Byte	Field		Val	Description
0	Type	Category	0x81	8 - Vehicle Message Type 1 - Configuration Category
1	Data		0x01	Bit masks defined as follows: 0x01 – Get

6.2.3.2 Vehicle.Config.Set

Transmitter: HU

Description: Message indicating Vehicle Pin Configuration, Head Unit Id.

Byte	Field		Val	Description
0	Type	Category	0x81	8 - Vehicle Message Type 1 - Configuration Category
1	Data		0x02	Bit masks defined as follows: 0x02 – Set
2	Data		-	Vehicle Pin Configuration.
3	Data		-	Head Unit id 0x00 = Default configuration 0x01 – Clarion = 10STD 0x02 – Panasonic = DA 0x03 – Panasonic = DA Bose 0x04-0xff Default configuration

Default configuration – DC shall behave as if configuration received is 0x02.

6.2.3.3 Vehicle.Config.Status

Transmitter: BT DC

Description: Message indicating Vehicle Pin Configuration, Head Unit Id.

Byte	Field		Val	Description
0	Type	Category	0x81	8 - Vehicle Message Type 1 - Configuration Category
1	Data		0x03	Bit masks defined as follows: 0x03 – Status
2	Data		-	Status Bit masks defined as follows: 0x01 – OK 0x02 – Error

6.2.3.4 Vehicle.Language.Set

Transmitter: HU

Description: Message indicating the Language of the HU.

Byte	Field		Val	Description
0	Type	Category	0x82	8 - Vehicle Message Type 2 - Language Category
1	Data		0x01	Set New Language
2	Data		-	Bit masks defined as follows: 0x00 – North American English 0x01 – Canadian French 0x02 – North American Spanish 0x03 – UK English 0x04 – French 0x05 – Italian 0x06 – German 0x07 – Portuguese 0x08 – Spanish 0x09 – Dutch 0x0A – Standard Arabic 0x0B – Mandarin 0x0C – Russian 0x0D - Korean

6.2.3.5 Vehicle.Language.Status

Transmitter: BT DC

Description: Message indicating whether the new Language is set in the Daughter Card.

Byte	Field		Val	Description
0	Type	Category	0x82	8 - Vehicle Message Type 2 - Language Category
1	Data		0x02	Status of new Language.
2	Data		-	Status Bit masks defined as follows: 0x01 – In Progress 0x02 – Completed

6.2.3.6 Vehicle.Moving

Transmitter: HU

Description: Message indicating whether the Vehicle is in Moving Condition or Idle Condition.

Byte	Field		Val	Description
0	Type	Category	0x84	8 - Vehicle Message Type 4 – Vehicle Moving Category.
1	Data		-	Bit masks defined as follows: 0x00 – Vehicle Moving State 0x01 – Vehicle Idle State

6.2.3.7 Vehicle.TopDown

Transmitter: HU

Description: Message indicating whether the Vehicle is in Moving Condition or Idle Condition. This message is sent once during initialization and thereafter at anytime when the Status of the Top changes dynamically.

Byte	Field		Val	Description
0	Type	Category	0x85	8 - Vehicle Message Type 5 – Vehicle Top Down Status Category
1	Data		-	Bit masks defined as follows: 0x00 – Vehicle Top is Open. 0x01 – Vehicle Top is Closed.

6.2.4 Display Message Set

6.2.4.1 Display.PhoneInfo

Transmitter: BT Daughter Card

Description: To notify the Head Units of the network field strenth (Antenna signal) and battery level of handset.

Byte	Field		Val	Description
0	Type	Category	0x41	4 - Display Message 1 - Phone Info Category
1	Data		-	Antenna Signal Info, Bit masks defined as follows: 0x07 – In Service 0x06 – Antenna Bar 5 – 80% to 100% 0x05 – Antenna Bar 4 – 60% to 79% 0x04 – Antenna Bar 3 – 40% to 59% 0x03 – Antenna Bar 2 – 20% to 39% 0x02 – Antenna Bar 1 – 1% to 19% 0x01 – Out of Range/ No Service 0x00 – No Phone Available. Phone not paired/Not in BT Range.
2	Data		-	Battery Level Info, Bit masks defined as follows: 0x03 – Battery 3 – 68 – 100% 0x02 – Battery 2 – 35 – 67% 0x01 – Battery 1 - 1-34% 0x00 – None 0%
3	Data		-	Message count. Range from 0 to 20 {count of unread messages}
4	Data			Device type 0x00h No device connected 0x01h Phone only 0x02h BT Audio only 0x03h Phone and BT Audio

Antenna Signal Info:

The BTHFU receives from the paired phone the number of available bars and the number of active bars.

The algorithm to determine the percentage (%) of power is active bars / available bars.

Example: A paired phone has a total of 5 available bars of which 3 are active. The percentage is calculated as:

Percentage = (3 / 5) * 100 = 60%

Battery Level Info:

The BTHFU receives from the paired phone the number of available bars and the number of active bars.

The algorithm to determine the percentage (%) of power is active bars / available bars.

Device Type:

Trying to use a device that is not present as reported by this parameter is not recommended as the DC will not be able to execute the desired behavior.

6.2.4.2 Display.VoiceRecognizerInfo

Transmitter: BT Daughter Card

Description: To notify the HeadUnit of the VR Info Message.

Byte	Field		Val	Description
0	Type	Category	0x42	4 - Display Message Type 2 - VR Info Category
1	Data		-	Header Id
2	Data		-	Footer Id
3-8	Data		-	Command List # 1 to Command List # 6, followed by 1 byte of
9	Data		-	Highlight command No.(00h～06h), 00h：No highlight, no talking head 01h to 06h：Command List Highlight and talking head not indicated
10	Data		-	Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
11-74	Data		-	UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

6.2.4.3 Display.CommandListInfo

Transmitter: BT Daughter Card

Description: To notify the HU of the Command List Information.

Byte	Field		Val	Description
0	Type	Category	0x43	4 - Display Message Type 3 – CMDlist info Category
1	Data		-	Header Id
2	Data		-	Footer Id
3-8	Data		-	Command List # 1 to Command List # 6
9	Data		-	Highlight command No.(00h～06h), 00h：No highlight and talking head icon indicated 01h to 06h：Command List Highlight and talking head icon not indicated
10	Data		-	Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
11-74	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

6.2.4.4 Display.PopUpInfo

Transmitter: BT Daughter Card

Description: To notify the HU of the Pop Up Information.

Byte	Field		Val	Description
0	Type	Category	0x44	4 - Display Message Type 4 - PopUp Info Category
1	Data		-	Header Id
2	Data		-	Footer Id
3	Data		-	Pop Up id
4	Data		-	Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
5-68	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

6.2.4.5 Display.CallingInfo

Transmitter: BT Daughter Card

Description: To notify the HU of the Calling Information Screen.

Byte	Field		Val	Description
0	Type	Category	0x45	4 - Display Message Type 5 - Calling Info Category
1	Data		-	Header Id
2	Data		-	Footer Id
3	Data		-	Call Status Id 00 – Outgoing Call In Progress 01 – Incoming Call Ringing 02 – Incoming call in Progress 03 – Incoming Call on hold 04 - Incoming call in progress with Call waiting 05 - Outgoing call with call waiting 06 - Outgoing call on hold
4	Data		-	Location 0x00h not defined 0x01h mobile 0x02h home 0x03h office 0x04h other
5	Data		-	Tel Name Length If the text length is 00h, no text data shall be sent.
6-37	Data		-	Text Data of Tel name Text to display will be: Outgoing Call In Progress - Active call Incoming Call Ringing - Incoming call Incoming call in Progress - Active call Incoming Call on hold - Active call Incoming call in progress with Call waiting - - Waiting call Outgoing call with call waiting - Waiting call Outgoing call on hold - Active call
38-40	Data		-	Call Log Hour – 0x00 to 0x3B Minute – 0x00 to 0x3B Second – 0x00 to 0x3B
41	Data		-	Tel Info Length If the text length is 00h, no text data shall be sent.
42-73	Data		-	Text Data of Tel Info

6.2.4.6 Display.DisplayInfo

Transmitter: BT Daughter Card

Description: To notify the HU of the Display Information.

Byte	Field		Val	Description
0	Type	Category	0x46	4 - Display Message Type 6 - DisplayInfo Category
1	Data		-	Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
2-66	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

Note:
Display.DisplayInfo shall always be padded with spaces to center align the display text (same as in GEN 3).

6.2.4.7 Display.ViewSMS

Transmitter: BT Card

Description: To send the contents of the SMS message.

Byte	Field		Val	Description
0	Type	Category	0x47	4 - Display Message Type 7 – Display SMS Text Category
1	Data		-	Name Length
2-34	Data		-	Name and/or Phone Number
35-37	Data		-	3 bytes: values dependent on format method If format method= 0 Time HH.MM.AM/PM AM = 0x1 PM = 0x2 If format nethod = 1 Day.unused.unused where day value 0 = Sunday 1=Monday 2=Tuesday 3=Wednesday 4=Thursday 5=Friday 6=Saturday Unused is always 00 If format method = 2 Day.month.unused Where Day is value 1 to 31 Month is value 1 to 12 (January to December) Unused is always 00
38				Time format method 0x0 time hh.mm.am/pm 0x1 Day.unused.unused 0x2 Day.month.unused
39	Data			Length of SMS message
40-104	Data		-	SMS Text Data (UTF-8 encoded in 8 bit Data)
105	Data		-	X: Message X of Y where X is the index of the current message in the list of unread messages
106	Data		-	Y: Message X of Y where Y is the total number of unread messages (Maximum value is 20)
107	Data		-	1 byte Button Labels 0x00h Read/Ignore 0x01h Reply/Exit

6.2.4.8 Display.BTAudioMenu

Transmitter: BT Daughter Card

Description: To notify the HU of the Command List Information.

Byte	Field		Val	Description
0	Type	Category	0x48	4 - Display Message Type 8 – BTAudioMenu
1	Data		-	Header Id
2 – 6	Data		-	Command List # 1 to Command List # 5
7	Data		-	Highlight command No.(00h～05h), 00h：No high light 01h to 05h：Command List High light

Note: this command is not used.

6.2.4.9 Display.BTAudioMetadata

Transmitter: BT Daughter Card

Description: Provide metadata for the current track for display

Byte	Field		Val	Description
0	Type	Category	0x4A	4 - Display Message Type A –Metadata
1	Data			1 Byte 0x01h AVRCP 1.0 0x02h AVRCP 1.3
2	Data		-	1 Byte - Length of Track Name. Use filename if track name is Blank
3 – n	Data			64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).
n+1	Data		-	1 Byte - Length of Album Name. Use zero length if Album name is blank
	Data			64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).
	Data		-	1 Byte -- Length of Artist Name. Use zero length if Artist name is blank
	Data			64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

6.2.4.10 Display.BTAudioSongPosition

Transmitter: BT Daughter Card

Description: To provide current position of the playing song.

Byte	Field		Val	Description
0	Type	Category	0x4B	4 - Display Message Type B –SongPosition
1-3	Data		-	3 Bytes, Hours, Minutes, Seconds

6.2.4.11 Display.BTMenu (Phone Settings)

Transmitter: BT Daughter Card

Description: To notify the HU of the Command List Information.

Byte	Field		Val	Description
0	Type	Category	0x4C	4 - Display Message Type C – BT Menu
1	Data		-	Header Id
2	Data		-	Right Slidebar indicator 1 byte Range 1-Eh (1 is top of menu, e is bottom, if value of 0 sent there should be no menu bar.)
3 – 7	Data		-	Command List # 1 to Command List # 5
8	Data		-	First Bit Talking head icon 0 -- no talking head 1 – talking head Next seven bits: Highlight command No.(00h～05h), 00h：No high light 01h to 05h：Command List High light Note: To illuminate talking head icon, 0x80h or 10000000 should be sent. Talking head should not appear when command is highlighted.
9	Back Button			0x00 – BackButton Not Available, At the top level BT settings menu. If the Back Button is received here, the DC will exit the BT Settings menu, HU will send the Userinput.Menu->End Menu command to the DC. 0x01 – Back Button Available, inside a BT operation under the BT Settings menu. DC will go back to the previous menu. The same menu item will still be highlighted.

6.2.4.12 Display.VRCustomSMSMenu

Transmitter: BT Daughter Card

Description: To notify the HU of the Custom Message List Information.

Byte	Field		Val	Description
0	Type	Category	0x4D	4 - Display Message Type D – VRCustomSMSMenu
1	Data		-	Header Id
2	Data			Footer ID
3 – 5	Data		-	Command List # 1 to Command List # 3
6	Data		-	First Bit Talking head icon 0 -- no talking head 1 – talking head Next seven bits: Highlight command No.(00h～03h), 00h：No high light 01h to 03h：Command List High light Note: To illuminate talking head icon, 0x80h or 10000000 should be sent. Talking head should not appear when command is highlighted.
7 .	Data		-	Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank
8-72	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character).

6.2.4.13 Display.BTAudioPlayState

Transmitter: BT Daughter Card

Description: To notify the HU of the play state information about the currently playing Bluetooth audio.

Byte	Field		Val	Description
0	Type	Category	0x4E	4 - Display Message Type E – BTAudioPlayState
1	Data		-	Random/repeat status 0x01h - Off 0x02h – All Repeat 0x03h – Folder Repeat 0x04h – Track Repeat 0x05h – All Random 0x06h - Folder Random

6.2.4.14 Display.BTPlayPauseStatus

Transmitter: BT Daughter Card

Message Type: OnEvent.

Description: To notify the HU of the play state information about the currently playing Bluetooth audio.

Byte	Field		Val	Description
0	Type	Category	0x4F	4 - Display Message Type F – BTPlayPauseStatus
1	Data		-	Play and Pause status 0x01h – BT Audio in Play state 0x02h – BT Audio Paused

6.2.5 Info Messages

6.2.5.1 PhoneList.Request

~~**Transmitter:** Head Unit~~

~~**Description:** The Head Unit needs a list of the currently paired phones.~~

~~Byte~~	~~Field~~		~~Val~~	~~Description~~
~~0~~	~~Type~~	~~Category~~	~~0x61~~	~~6 – Setup Message Type~~ ~~1 – Request List of Paired phones from BT Daughter Card .~~

6.2.5.2 CustomSMSList.Request

~~**Transmitter:** Head Unit~~

~~**Description:** The Head Unit needs a list of the currently paired phones.~~

~~Byte~~	~~Field~~		~~Val~~	~~Description~~
~~0~~	~~Type~~	~~Category~~	~~0x62~~	~~6 – Setup Message Type~~ ~~2 – Request List of Custom SMSText replies from BT Daughter Card .~~

6.2.5.3 Info.CustomMessageText

Transmitter: BT Card

Description: To notify the HU of the Custom message text Information. Each one of these strings will be associated with a fixed ID that can be found in the Voice Prompts spec.
These are variable length strings with a 64 byte maximum size, there will be no padding of the string, the length will define the actual sized of the string to be sent.

Byte	Field		Val	Description
0	Type	Category	0x63	6 - Info Message Type 3 – Custom SMS Category
1	Data		-	Custom Message 1:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
2-N	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0x90.
	Data		-	Custom Message 2:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0x91.
	Data		-	Custom Message 3:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0x92.

6.2.5.4 Info.PhoneList

Transmitter: BT Daughter Card

Description: To return the list of paired phones and the types.

Byte	Field		Val	Description
0	Type	Category	0x64	6 - Info Message Type 4 –Phone Names and Types
1	Active Phone		0 - 5	0x00 – There is not a phone currently connected to the system. 0x01 to 0x05 – The index of the phone that is currently connected. This relates to the list below.
2				Phone Name 1:Text data length (# of characters). If the text length is 00h, no text data shall be sent.
	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). Selectable through Command ID 0x93h
	Data			1 byte Type: 0x00h = Phone 0x01h = Bluetooth Audio source 0x02h = Both 0x03h = no device
	Data		-	Phone Name 2:Text data length (# of characters). If the text length is 00h, no text data shall be sent.
	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). Selectable through Command ID 0x94h
				1 byte Type: 0x00h = Phone 0x01h = Bluetooth Audio source 0x02h = Both 0x03h = no device
	Data		-	Phone Name 3:Text data length (# of characters). If the text length is 00h, no text data shall be sent.
	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). Selectable through Command ID 0x95h
				1 byte Type: 0x00h = Phone 0x01h = Bluetooth Audio source 0x02h = Both 0x03h = no device
	Data		-	Phone Name 4:Text data length (# of characters). If the text length is 00h, no text data shall be sent.
	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). Selectable through Command ID 0x96h
				1 byte Type: 0x00h = Phone 0x01h = Bluetooth Audio source 0x02h = Both 0x03h = no device
	Data		-	Phone Name 5:Text data length (# of characters). If the text length is 00h, no text data shall be sent.
	Data		-	64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). Selectable through Command ID 0x97h

Byte	Field	Val	Description
			1 byte Type: 0x00h = Phone 0x01h = Bluetooth Audio source 0x02h = Both 0x03h = No device

6.2.5.5 Info.SavedMSG

Transmitter: BT Card

Description: To notify the HU of the Custom message text Information. Each one of these strings will be associated with a fixed ID that can be found in the Voice Prompts spec.

These are variable length strings with a 64 byte maximum size, there will be no padding of the string, the length will define the actual sized of the string to be sent.

Byte	Field		Val	Description
0	Type	Category	0x65	6 - Info Message Type 5 – Saved SMS Category
1	Data		-	Saved Message 1:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
2-N	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0xB9.
	Data		-	Saved Message 2:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0xBA.
	Data		-	Saved Message 3:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0xBB.
	Data		-	Saved Message 4:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0xBC.
	Data		-	Saved Message 5:Text data length (# of characters). If the text length is 00h, no text data shall be sent. By this data, the display will be blank.
	Data		-	Maximum of 64 bytes of UTF-8 encoded in 8 bit Data. (1 Byte or 2Byte/1 character). This text string can be accessed using the constant 0xBD.

6.2.6 HeartBeat

6.2.6.1 HeartBeat.BTCARD

BTCard to Head Unit Heartbeat

Message Type: EventCyclic

Transmitter: BT Daughter Card

Description: BT Daughter Card current status sent at a cyclic rate defined in messsage.

Byte	Field		Val	Description
0	Type	Category	0x71	7 – HeartBeat 1 –BT DC to Head Unit
1	Data		-	Bit5: 0x00h = Shutdown Not in progress 0x01h = Shutdown in progress
2	Data			Heartbeat length in Seconds

Note: Heartbeat length shall be 1 second. If heartbeat is lost for more than 2 minutes, HU should issue a reset.

6.2.6.2 HeartBeat.HeadUnit

HeadUnit to BTCard Heartbeat

Transmitter: Head Unit

Description: The Head Unit current status sent at a cyclic rate of 1 time per second.

Byte	Field		Val	Description
0	Type	Category	0x72	7 – HeartBeat 2 – Head Unit to BTCard
1	Data		-	Bit5: 0x00h = Shutdown Not in progress 0x01h = Shutdown in progress
2	Data			Heartbeat Length in Seconds

Note: Heartbeat length shall be 1 second. If heartbeat is lost for more than 2 minutes, HU should issue a reset.

6.2.7 Diagnostics

6.2.7.1 Diagnostic.RxFromTester

Transmitter: Head Unit to BTCard

Message Type: Event, Spontaneaus

Description: The Head Unit or Tester will sent this message to request the BT DC to perform a predefined diagnostic operation.

Byte	Field		Val	Description
0	Type	Category	0x91	9 – Diagnostics 1 – Diagnostic Message Received
1	Length		-	Length of Message (SID + PID + Data)
2	SID		-	Service ID (SID)
3	PID		-	Parameter ID (PID)
4 - ?	Data			Maximum Byte length of 1020 bytes. There may not be any data as the PID ID may indicate a read without options.

6.2.7.2 Diagnostic.TxToTester

Transmitter: BT Card to Head Unit

Message Type: Event

Description: The BT DC will respond to a Diagnostic Request from the Requester a message formated as below, depending on the success of the operation.

6.2.7.2.1 Positive Response Frame Format

Byte	Field		Val	Description
0	Type	Category	0x92	9 – Diagnostics 2 – Diagnostic Message Sent
1	Length		-	Length of Message (PRSID + Data)
2	Request Service ID + $40		-	Positive Response Service ID
3	Valid Parameter #1 Value		-	Conditional, depending on the response values that need to be received. Maximum Byte length 1020 bytes.
N	Valid Parameter #n-1 Value			

6.2.7.2.2 Negative Response Frame Format

Byte	Field		Val	Description
0	Type	Category	0x92	9 – Diagnostics 2 – Diagnostic Message Sent
1	Length		-	Length of Message (PRSID + Data)
2	Negative Response Service ID		$7F	Negative Response Service ID
3	Request Parameter ID		-	Parameter ID of requested action (PID)
4	Negative Response Code			1 byte. Code indicating the reason for the failed diagnostic action request.

6.2.8 UserInput

6.2.8.1 Userinput.Button

Transmitter: HU

Description: Message indicating what button has been pressed.

Byte	Field		Val	Description
0	Type	Category	0xA1	A - Vehicle Message Type 1 - Button Category
1	Data		-	1 byte affected button: 0x00h – STRG SW PTT (DA and 10STD) 0x01h – STRG SW Phone/End(DA and 10STD) 0x02h – STRG SW Up(DA and 10STD) 0x03h – STRG SW Down(DA and 10STD) 0x04h – STRG SW Enter(DA and 10STD) 0x05h – STRG SW BACK(DA and 10STD) 0x06h – Bezel Rotary Tune(DA) 0x07h – Bezel Scan (DA and 10STD) 0x08h – Bezel DISP (10Std) 0x09h – Bezel RPT/RND (10STD) 0x0ah – Bezel Back(DA) 0x0bh – Bezel seek up(DA and 10STD) 0x0ch – Bezel seek down(DA and 10STD) 0x0dh – Bezel Preset 1(DA) 0x0eh – Bezel Preset 2(DA) 0x0fh – Bezel Preset 3(DA and 10STD) 0x10h – Bezel Preset 4(DA and 10STD) 0x11h - Bezel Preset 5(DA) 0x12h – Bezel preset 6(DA)
2				1 byte for event type 0x00h – Press (also sent at 100ms intervals until button is released) 0x01h –hold (not used) 0x02h - release 0x03h – rotary up event 0x04h – rotary down event

Note: These button shall be sent only when the HMI context of these button events requires the DC to respond. Not all buttons are present in every head unit. Rotary up and down events are used only for Bezel rotary tune button type.
SW Enter is handled by DC identically to SW PTT.
SW Back is handled by DC identically to SW END

6.2.8.2 Userinput.Menu

Transmitter: HU

Description: Message indicating what button has been pressed.

Byte	Field		Val	Description
0	Type	Category	0xA2	A - Vehicle Message Type 2 – Menu Category
1	Data		-	Bit masks defined as follows: 0x00 – Start Menu 0x01 – End Menu

6.2.9 MCAN pass through messages

6.2.9.1 AudioWarning

Transmitter: DC

Description: Message used to indicate AudioWarning message.

Byte	Field		Val	Description
0	Type	Category	0xB1	B - MCAN Message Type 1 – AudioWarning type
1	Data		-	00h: interrupt disable 01h: Interrupt enable
2	Data			0x14h source Icon BT-Audio 0x00h source icon non-display
3	Data		-	0xFF – Audio Warning State- External Text 0x02 – Audio Warning State - External Sound
4	Data			0x01h – char set ASCII 0x05h – char set UTF-8
5	Data			0h – 40h Length
6 - 69	Data			Text body in utf-8 if length = 0, text body = 0 bytes (this text is what is displayed in the warning -- things like “Phone connection lost” or what ever is appropriate for the warning.

6.2.9.2 HF

Transmitter: DC

Description: Message used to indicate info and Menu parameters during a HF Call It is passed through to CAN by HU

Byte	Field		Val	Description
0	Type	Category	0xB2	B - MCAN Message Type 2 – HF type
1	Data		-	0x00h hf_info = start 0x01h hf_info = end
2	Data			0x05h char set = utf-8
3	Data			Length of string
4-67	Data			Text body if length = 0, text body = 0 bytes
xx	Data			0x01h sw1 label = Answer(Tel) 0x02h sw1 label = Answer((VR+TEL)
xx	Data			0x00h sw1 status=Not_Select 0x01h sw1 status=Select 0x02h sw1 Status= Enter
xx	Data			0x01h sw2 label = Decline(Tel_END)
xx	Data			0x00h sw2 status=Not_Select 0x01h sw2 status=Select 0x02h sw2 Status= Enter

6.2.9.3 SMS

Transmitter: DC

Description: Message used to indicate info and Menu parameters during SMS session. It is passed through to CAN by HU

Byte	Field		Val	Description
0	Type	Category	0xB3	B - MCAN Message Type 3 – SMS type
1	Data		-	0x00h sms_state Start 0x01h sms_state = end 0x02h sms_state = MSG_Number_Update
2	Data			Msg_Number
3	Data			0x05 char set utf-8
4	Data			Length of Name/Number if length = 0, text body = 0 bytes
5-xx	Data			0-64 byte Name/Number the text was received from.
X	Data			SW1 Label – 0x01h = Menu(Tel) 0x02h = Menu(VR) 0x03h = Menu(VR+Tel) 0x04h = Read(Tel) 0x05h = Read(VR) 0x06h = Read(VR+Tel)
	Data			SW1 Status: 0x00h = Not_Select 0x01h = Select 0x02h = Enter
	Data			SW2 label: 0x01h = Exit(Tel_End) 0x02h = Ignore(Tel_End)
	Data			SW2 Status: 0x00h = Not_Select 0x01h = Select 0x02h = Enter

6.2.9.4 VR

Transmitter: DC

Description: Message used to indicate info parameters during VR session. It is passed through to CAN by HU

Byte	Field		Val	Description
0	Type	Category	0xB4	B - MCAN Message Type 4 – VR type
1	Data		-	VR STATE 0x00h = Start 0x01h = during 0x02h = End
2	Data			On_Off 0x00h = Off 0x01h = On 0x02h = Off(Manual_Mode) 0x03h = SMS_Sending 0x04h = Off(HF_Mode)

6.2.9.5 Disc

Transmitter: DC

Description: Message used to indicate Disc parameters during BT_Audio playback. It is passed through to CAN by HU

Byte	Field		Val	Description
0	Type	Category	0xB5	B - MCAN Message Type 5 – Disc
1	Data		-	Interrupt 1 byte 0x00h = Disable 0x01h = Enable
2	Data			Disc_Source Update 1 byte 0x00h = Not updated 0x01h = Updated
	Data			Disc Source –1 byte contents/source 0x85h = 10000101 for Video / BT-Audio 0x05h = 00000101 for Audio/ BT-Audio
	Data			Track update 0x00h Not Updated 0x01h updated
	Data			Track Label 0x00h nondisplay 0x01h Track 0x02h Chapter 0x03h File
	Data			Track number: 3 bytes Range from 0 – 1869Fh
	Data			Text Info Char set 05h - UTF-8
	Data			Text Length 0x0h – 0x40h
	Data			Text Body 0-64 Bytes (0 bytes if text length = 0)
	Data			Group Update 1 byte 0x00h Not_Updated 0x01h Updated
	Data			Group Label 1 Byte 0x00h Non Display 0x01h Disc 0x02h Album 0x03h Group 0x04h Folder 0x05h Title
	Data			Group Number 2 bytes Range: 0h - 270Fh
	Data			Group Char set 05h - UTF-8
	Data			Group Length 0x0h – 0x40h
	Data			group text body 0-64 Bytes (0 bytes if text length = 0)
	Data			Artist update 1 byte

Byte	Field	Val	Description
			0x00h Not Updated 0x01h Updated
	Data		Artist Label 1 byte 0x00h nonDisplay 0x01h Artist
	Data		Artist CharSet 1 byte 0x05h UTF-8
	Data		Artist Length 1byte Range – 0-0x40h
	Data		Artist Text 0-64Bytes (0 bytes if text length = 0)

6.2.9.6 MCAN Behavior

- **Sequences**
  - The following information is the detail that is missing from the MCAN Sequence Spec IT Master – Meter that is provided by Nissan. Please use the Spec IT Master in conjunction with these rules below.
- **Meter General Rules**
  - Any meter messages that also have a head unit comparable message, they should be sent is succession to each other so that the visual cue from the User will appear that they appeared at the same time.
  - The HF, VR and SMS messages required an State=End message to dismiss this message from the meter. SMS and HF messages can cover the VR message. When the HF or SMS message in front of it is ended, the VR message can still be present unless it is ended also.
  - Audio Warning messages do not have an End message and are just sent when required. No further management of them is necessary.
  - Disc messages do not have an End message. They are sent and the Meter will handle their display lifetime.

- **Session definition for sending MCAN NBUS messages**
  - VR, HF and SMS messages.
    - Start of the MCAN Session. The message below defines the Start of the MCAN Session. MCAN messages sent over NBUS AFTER this message is successfully sent will be sent on the MCAN bus for the meter to display:
      - VR and HF: HU→DC – <Audio.TelPermit.Start>
      - Disc: HU→DC – <Audio.BTPermit.RequesttoStart>
      - SMS: DC→HU – < Power.Initialization.Full Run>
    - End of the MCAN Session. The message below defines the End of the MCAN Session. MCAN messages sent over NBUS after this message is successfully sent will NOT be sent on the MCAN bus. Any MCAN messages required to dismiss DC MCAN Meter messages must be sent before the end of the session:
      - VR and HF: DC→HU: <Audio.TelInterrupt.End >
      - Disc: HU→DC <Audio.BTPermit.RequestToEnd>
      - SMS: HU→DC <Power.Shutdown.Request>
  - Audio Warning (AW) messages
    - Start of the MCAN Session. The message below defines the Start of the MCAN Session. MCAN messages sent over NBUS AFTER this message is successfully sent will be sent on the MCAN bus for the meter to display:
      - HU→DC: <AudioTelPermit.Start>
      - HU→DC: < Audio.BTPermit.RequesttoStart >
    - End of the MCAN Session. The message below defines the End of the MCAN Session. MCAN messages sent over NBUS after this message is successfully sent will NOT be sent on the MCAN bus.:
      - DC→HU: <Audio.TelInterrupt.End >
      - DC→HU: < Audio.BTInterrupt.End>

- **MCAN VR Messaging**
  - The Audio Warning message shall only be sent once per VR session after the first Startmessage is sent with the default parameters.
  - A VR Session is defined as when a Speaking and/or Listening and/or Manual mode and/or off(HF_mode) session is followed by a Clearing of VR Banners.
  - The GOM module should follow the sequence in 50-4 as it does not have audio VR.
  - VR Session 50-2
    - Speaking
      - This will be sent at the start of a VR session when the DC is producing utterances of importance.
        - VR State Parameters

        - 0x00 – Start
      - On_Off Parameters
        - 0x00 – Off
  - Listening
    - This will be sent at the start of the User input session when the DC is listening to the user trying to control it.
      - VR State Parameters
        - 0x00 – Start
      - On_Off Parameters
        - 0x01 – On
- Manual mode 50-3
  - Speaking
    - This will be sent at the start of a VR session when the DC is producing utterances of importance.
      - VR State Parameters
        - 0x00 – Start
      - On_Off Parameters
        - 0x00 – Off
  - Listening
    - This will be sent at the start of the User input session when the DC is listening to the user trying to control it.
      - VR State Parameters
        - 0x00 – Start
      - On_Off Parameters
        - 0x01 – On
  - Manual Mode
    - The user has selected Manual Mode during the VR session.
      - VR State Parameters
        - 0x00 – Start
      - On_Off Parameters
        - 0x02 – Off (Manual_Mode)
- System without VR (GOM)
  - Speaking
    - This will be sent at the start of a VR session but there shall not be any voice activation.
      - VR State Parameters
        - 0x00 – Start
      - On_Off Parameters
        - 0x04 – Off (HF_Mode)
- Clearing of VR banners
  - The clearing shall be done at the end of a Speaking or Listening session.
      - VR State Parameters
        - 0x01 – End
- After the first VR.Start message is sent, the DC shall send the Audio Warning message immediately after it. It shall always be sent with the same parameters:
  - 00h – interrupt disable
  - 0x00h – source icon non-display
  - 0x02h – Audio Warning State - External Sound
  - 0x05h – char set UTF-8
  - 0h – Length

- **MCAN HF Messaging.**
  - The DC shall implement the sequences 30-1 (Answer Call) and 30-3 (Decline Call).
  - The DC shall not implement the sequence 30-2.
  - The Audio Warning message shall be sent immediately after the first MCAN.HF,Start message is sent.
  - Incoming Call HF Message Parameters

        - HF State Parameters
            - 0x00 - Start
        - SW1 Label Parameter:
            - For systems with VR (NAM), this should always be a 0x02 (Answer VR+TEL)
            - For system without VR (GOM), this should always be a 0x01 (Answer TEL)
        - SW2 Status Parameter:
            - 0x00 Not_Select – The button is shown as clear, not selected
            - 0x01 Select – This parameter will show the button as selected, white.
            - 0x02 Enter – This parameter is not used.
    - Incoming Call – Press of the PTT or End button.
        - Accept the Incoming call (30-1: Incoming Call Answer)
            - HF State Parameters
                - 0x00 - Start
            - SW1 parameters
                - Label
                    - For systems with VR, this should always be a 0x02 (Answer VR+TEL)
                    - For system without VR (GOM), this should always be a 0x01 (Answer TEL)
                - Select
                    - 0x01 Select – This parameter will show the button as selected, white.
            - SW2 Parameters
                - Label
                    - 0x01 – Decline
                - Select
                    - 0x00 Not_Select – The button is shown as clear, not selected
        - Decline the Incoming call (30-3: Incoming Call Decline)
            - HF State Parameters
                - 0x00 - Start
            - SW1 Parameters
                - Label
                    - For systems with VR, this should always be a 0x02 (Answer VR+TEL)
                    - For system without VR (GOM), this should always be a 0x01 (Answer TEL)
                - Select
                    - 0x00 Not_Select – The button is shown as clear, not selected
            - SW2 Parameter
                - Label
                    - 0x01 – Decline
                - Select
                    - 0x01 Select – This parameter will show the button as selected, white.
    - The HF Indication End message shall be sent right after the Accept/Decline decision message is made with the PTT or Enter button. The meter will take care of the HMI component that will allow a delay of the messages on the screen.
        - HF State Parameters
            - 0x01 – End
    - Outgoing call
        - VR will follow the VR of 50-2.
        - MM we will follow the VR of 50-3.
        - When the call is connected, the DC will clear the VR Banner. This could be the ringing or actual call connected.
        - From Phone, if the call is originated form the handset, only the AW message will be sent.
        - NO HF messages in outgoing call.
- **MCAN SMS Messaging**
    - Send the Name or Number in the text field of the message. There could be situations where the name or number are not known at the time the SMS is received. The DC shall send an SMS indication with a zero length Text Body if the name or number are not available. If these become available, the message shall be sent out again with the same SW values but with the name or number present.

- Messages sent to the Meter shall be sent at the same time as messages meant to update the display on the HU.
- 40-3: User Chooses the Ignore command
  - Receive SMS
    - SMS_State = 0x01 Start.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
      - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
      - 0x00 Not_Select – The button is shown as clear, not selected.
    - SW2 Parameters
      - 0x02h = Ignore(Tel_End)
      - 0x00 Not_Select – The button is shown as clear, not selected.
  - SMS Ignore Operation
    - SMS_State = 0x01 Start.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
      - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
      - 0x00 Not_Select – ~~This parameter will show the button as selected, white~~. The button is shown as clear, not selected.
    - SW2 Parameters
      - 0x02h = Ignore(Tel_End)
      - 0x01 ~~Not~~ Select – ~~The button is shown as clear, not selected.~~ This parameter will show the button as selected, white.
  - SMS.Indication.End message sent right after the last MCAN.SMS message.
    - SMS_State = 0x00 ~~Start.~~End.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
      - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
      - 0x00 Not_Select – The button is shown as clear, not selected
    - SW2 Parameters
      - 0x00 Not_Select – The button is shown as clear, not selected.
  - SMS.Indication.End message sent right after reply.
- 40-4: User Chooses the Reply command
  - Receive SMS (Display (Read, Ignore)
    - SMS_State = 0x01 Start.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
      - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
      - 0x00 Not_Select – The button is shown as clear, not selected
    - SW2 Parameters
      - 0x02h = Ignore(Tel_End)
      - 0x00 Not_Select – The button is shown as clear, not selected
  - SMS Read Operation
    - SMS_State = 0x01 Start.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
      - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
      - 0x01 Select – This parameter will show the button as selected, white.
    - SW2 Parameter
      - 0x00 Not_Select – The button is shown as clear, not selected
  - SMS Display (Reply Exit) menu
    - SMS_State = 0x01 Start.
    - SW1 Parameters
      - For systems with VR, this should always be a 0x03h = Menu(VR+Tel).
      - For system without VR (GOM), this should always be a 0x01h = Menu(Tel).

- 0x01 Select – This parameter will show the button as selected, white.
- SW2 Parameters
  - 0x01h = Exit(Tel_End)
  - 0x00 Not_Select – This parameter will show the button as Not selected.
- SMS Reply Operation
  - SMS_State = 0x01 Start.
  - SW1 Parameters
    - For systems with VR, this should always be a 0x03h = Menu(VR+Tel).
    - For system without VR (GOM), this should always be a 0x01h = Menu(Tel).
    - 0x01 Select – This parameter will show the button as selected, white.
  - SW2 Parameters
    - 0x01h = Exit(Tel_End)
- SMS.Indication.End message sent right after reply.

o 40-5: User Chooses the Exit command
- Same as 40-4 except the Exit is selected.
- SMS Exit Operation
  - SMS_State = 0x01 Start.
  - SW1 Parameter
    - For systems with VR, this should always be a 0x03h = Menu(VR+Tel).
    - For system without VR (GOM), this should always be a 0x01h = Menu(Tel).
    - 0x00 Not_Select – This parameter will show the button as Not selected.
  - SW2 Parameter
    - 0x01h = Exit(Tel_End)
    - 0x01 Select – This parameter will show the button as selected, white.
- SMS.Indication.End message sent right after reply.

o 40-6 Message Number update
- This message is sent during the initialization of the DC to inform the Meter of the current number of unread messages. It does not require any dismissal.
- If the user is updating his phone manually while connected to the system, the DC shall send this message to the meter to update it. It does not require any dismissal.
- This message does not require the SMS.End message to be sent.
- SMS Message Number Update
  - SMS_State = 0x02 Msg_Number_Update.
  - Msg_Number = Number of unread SMS messages.
  - No Text is to be sent with this message.
  - SW1 Parameter
    - For systems with VR, this should always be a 0x06 = Read(VR+Tel)
    - For system without VR (GOM), this should always be a 0x04h = Read(Tel)
    - 0x00 Not_Select – This parameter will show the button as Not selected.
  - SW2 Parameter
    - 0x02h = Ignore(Tel_End)
    - 0x00 Not_Select – This parameter will show the button as Not selected.

o SMS.Indication.End Message Definition.
- SMS_State
  - 0x01 = End.
- SW1 Parameters
  - For systems with VR, this should always be a 0x06 = Read(VR+Tel).
  - For system without VR (GOM), this should always be a 0x04h = Read(Tel).
  - 0x00 Not_Select – The button is shown as clear, not selected
- SW2 Parameters
  - 0x00 Not_Select – The button is shown as clear, not selected

- **Audio Warning Message**

o It shall always be sent with the same parameters:
- 0x00h – interrupt disable

- 0x00h – source icon non-display
- 0x02h – Audio Warning State - External Sound
- 0x05h – char set UTF-8
- 0x0h – 40h Length

- **MCAN Disc Messaging**
  - If one of the fields in the Disc message is updated, the entire message needs to be resent with all of the information that is available about the track even if the Update value for that text tag is "Not_Updated". Track updates are natural non-user actions. Therefore Interupt shall be set to **Disabled.**
  - Disc message will not be sent periodically except for the reasons in the requirement for Scan and FF/Rew.
  - Scan, FF/RW and Track Up/Down
    - Require an update at a 1 second rate. This message will contain all of the information about the track every time.
    - Track, FF/RW, Scan will always have the Interrupt set to **Enable**. These are user directed activities.
    - During a FF/RW session, if the track changes before the next one second update occurs, then the DC shall send an updated Disc message (Event) with the updated track information. The one second cyclic timer is restarted from the Disc Event message.
    - When a new track number is set, only the Track Update parameter shall indicate 0x01 - Updated.
    - The Group and Artist Update parameters shall stay at Not_Updated even if the information has changed for these strings.
    - The message shall include the new information for Group and/or Artist.
    -
  - Natural song changes due to the end of songs or other Non-User initiated activities, the Interrupt shall be **Disabled**.
  - The XXXX.Update field shall indicate what parameter is updated in the message. Even though other parameters may not be updated they shall all be sent.
  - When the Interrupt is **Disabled**, all XXXX.Update parameters shall be set to 0x00 – Not Updated.
  - Sequences not followed are:
    - 12-3
    - 12-4
    - 12-7
    - 12-8
    - 12-10
    - 12-11
    - 12-12
    - 12-15
    - 12-16
  - 12-1: The HU has changed to BT Audio
    - The HU will send this message with the default values in it shown on the sheet before the DC when the BT Audio. The HU will handle the negotiation of the messages.
    - DC message shall be sent these values unchanging:
      1. Interrupt = Enable
      2. Disc_Source = 0x05h – 00000101 for Audio/ BT-Audio.
      3. Text Info Char set = 05h – UTF-8.
      4. Group Char set = 05h – UTF-8.
      5. Artist CharSet 1 byte = 05h – UTF-8.
    - The BT shall send an updated message with Song data when it becomes available.
  - 12-2: Change of Disc Source
    - This is handled by the sequence in 12-1. When BT Audio is selected, the behavior in 12-1 is executed by the DC. When the HU changes to another audio source, the DC shall NOT send any disc messages.
  - 12-5: Track Up/Down. This message is sent when the track is changed by a user action.
    - Interrupt = Enable.
    - Track.Update = Updated,

- Group.Update = Not_Updated,
- Artist.Update = Not_Updated,
- Track.Label = Track
- Track.No = <Updated Track Number>
- Track.Text_Info = <Updated Track Text, if available>

o 12-6: Fast Forward (rewind). This message is sent at the 1 second periodic rate when this action is active.
- Interrupt = Enable.
- Track.Update = Updated,
- Group.Update = Not_Updated,
- Artist.Update = Not_Updated,
- Track.Label = Track
- Track.No = <Updated Track Number>
- Track.Text_Info = <Updated Track Text, if available>

o 12-9: Track Up(Down) w/o text information, with user operation. This message is sent when the track is changed by a user action.
- Interrupt = Enable,
- Track.Update = Updated,
- Group.Update = Not_Updated,
- Artist.Update = Not_Updated,
- Track.Label = Track,
- Track.No = <Updated Track Number>

o 12-13: Track Up with text information, w/o user operation. This is a track change that occurs when a track ends naturally and the next track is cued automatically.
- Interrupt = Disable
- Track.Update = Not_Updated
- Group.Update = Not_Updated
- Artist.Update = Not_Updated
- Track.Label = Track
- Track.No = <Updated Track Number>
- Track.Text_Info = <Updated Track Text, if available>

o 12-14: Track Up w/o text information, w/o user operation. This is a track change that occurs when a track ends naturally and the next track is cued automatically.
- Interrupt = Disable
- Track.Update = Not_Updated
- Group.Update = Not_Updated
- Artist.Update = Not_Updated
- Track.Label = Track
- Track.No = <Updated Track Number>

o 12-17: Scan operation. This message is sent at the 1 second periodic rate when this action is active.
- Interrupt = Enable
- Track.Update = Updated
- Group.Update = <Set to Updated if avail>
- Artist.Update = <Set to Updated if avail>
- Track.No = <Updated Track Number>
- Track.Text_ = <Updated Track Text>

o Bluetooth audio is not available or has disconnected from the DC.
- Interrupt = Disable
- Disc Source Update = Not_Updated
- Disc Source = 05h BT-Audio
- Track Update = Not_Updated
- Track.Label = nondisplay
- Track.No. = 0x00 0x00 0x00
- Text Info Char Set = 0x05
- Text Length = 0x00
- Group Update = Not_Updated
- Group.Label = nondisplay
- Group.No = 0x00 0x00

- Group No Char Set = 0x05
- Group Length = 0x00
- Artist Update = Not_Updated
- Artist.Label = nondisplay;
- Artist Char Set = 0x05
- Artist Len = 0x00

7 Graphics

7.1 TCR GENERATED

7.1.1 TCR GENERATED

7.1.1.1 Display field contents responsibility

Note: Graphics are for referencing areas only. They are not representative of actual graphics in terms of rendering, color, or placement

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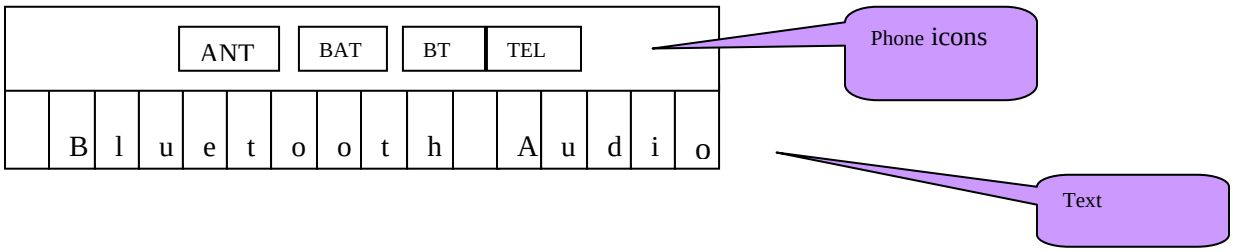
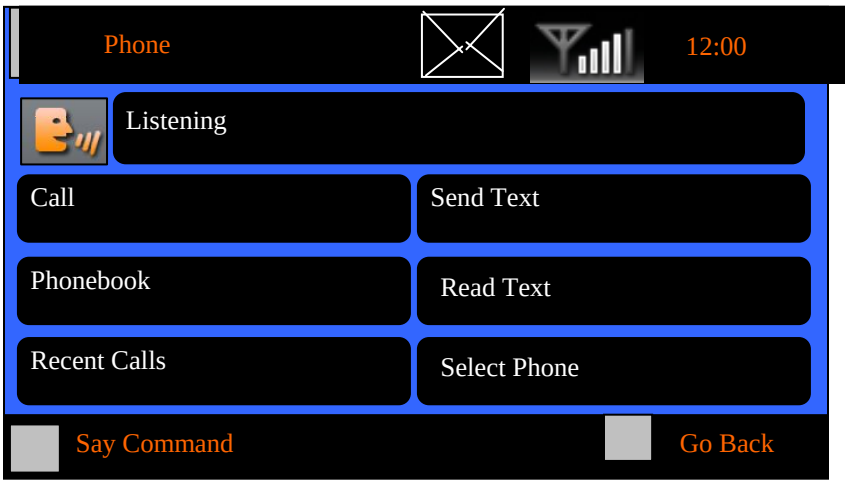
7.2 10Std all screens



Used for all 10STD screens using DisplayInfo message

1. Text - received via DisplayInfo message
2. Phone Icons - graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.

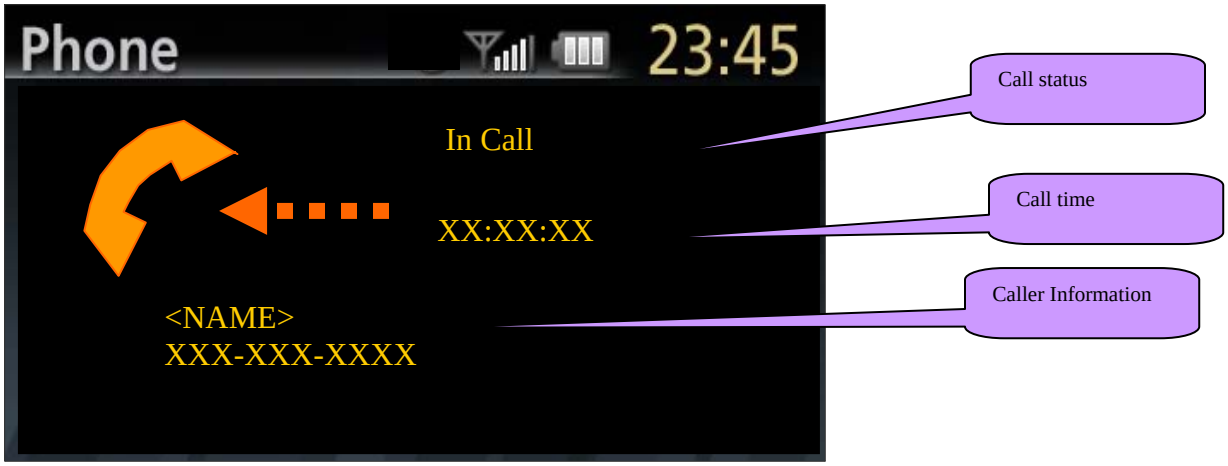
10DA command list screen



This screen used for Display when VRRecognizeInfo and CommandListInfo messages received.

1. Header – Hex value sent by DC, indexed into correct language by HU
2. Head Icon – Shown when Highlight command value = 0x00h in CommandListInfo
3. Footer - Hex value sent by DC, indexed into correct language by HU
4. Command List - Hex value sent by DC, indexed into correct language by HU
5. Text Area - -UTF-8 text sent by DC.
6. Phone Icons – graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.

10DA InCall Screen



This screen used for display when CallingInfo message is received.

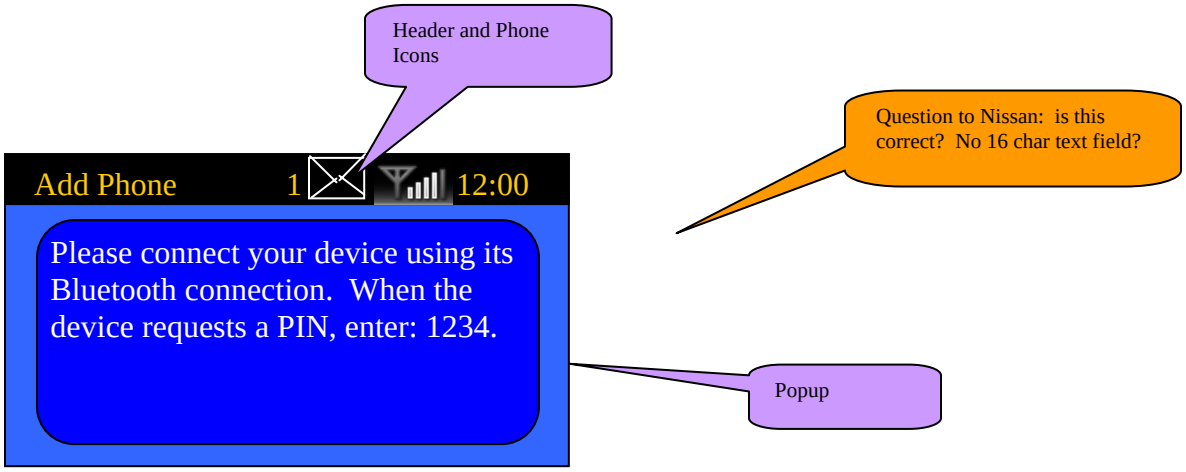
1. Caller Information - Name from TelName data field, number from TelInfo field
2. Call time – Time information from Call log field of CallingInfo
3. Call Status – status from Call status field of CallingInfo
4. Header – Hex value sent by DC, indexed into correct language by HU
5. Phone Icons – graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.

7.3 10DA BTAudio

This screen used when DisplayBTAudio message is received.

1. Header – Hex value sent by DC, indexed into correct language by HU
2. Phone Icons – graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.
3. MetaData – Text send by DC
4. Playback Status- Value sent by DC
5. Controls - HU generated

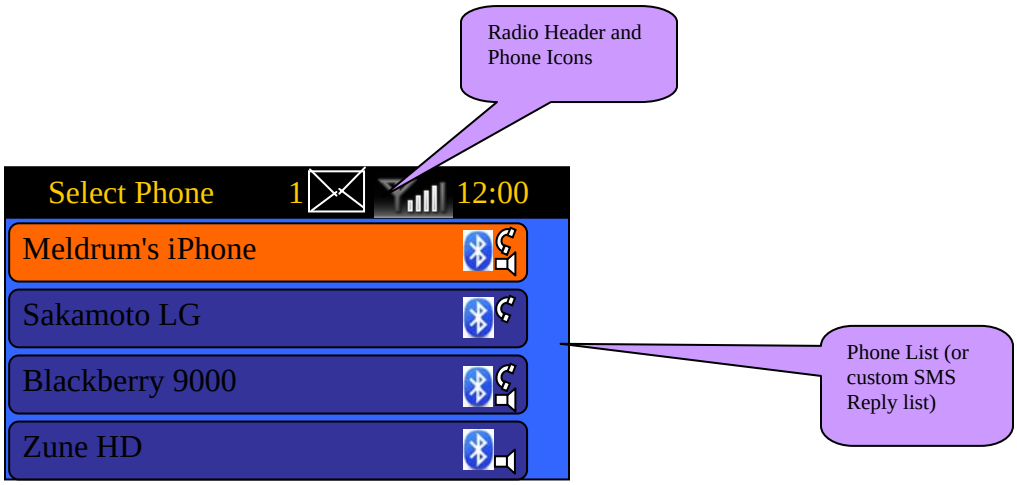
7.4 10DA Popup screens



This display used when PopupInfo message received.

6. Header – Hex value sent by DC, indexed into correct language by HU
7. Phone Icons – graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.
8. Popup - Hex value sent by DC, indexed into correct language by HU

7.5 10DA Setup screens



This menu list occurs in a Radio controlled menu. It is controlled by HU.

1. Header – This case header selected by HU.
2. Phone Icons - graphic chosen by HU based on Hex value sent by DC in PhoneInfo message.
3. Phone list - text requested from DC by using PhoneListReply message or CustomMessageSelection message.
4. Radio controls list management such as highlighting.

Note: 19Nov2010 Benedict: need to review custom message list HMI when update is received from Nissan to ensure this specification can deliver intended functionality.

8 Reference

1. CAN Spec - tms_infotainment_apps\Nissan_MVL_09\Docs\Requirements\GEN3_CAN_Spec20080703.xls
2. N_BUS Spec 28330 NDS00AVC System Comm Spec1.pdf

9 Revision History

Revision Level	Date	Section / Page	Author	Description of Revision
1.0	2-Nov-10	All	mpalani1/ysivakum	Initial draft version capturing message format, Initialization and Shutdown sequence
1.1	9-Nov-10	All	Mpalani1	Captured Audio Arbitration Sequence, Message Categories and Types, Message Set Details for all Messages.
1.2	10-Nov-10	All	Mpalani1	Updated Review Comments from Rob and added sequence diagrams for Other Vehicle Messages.
1.3	12Nov2010	All	Benedict/Flood	Added sequences, messages, updated some previous content
1.4	15Nov2010	4.6, 4.10 4.15 5.3.7 4.12	Benedict	Add direction to Topdown message Add SMS when vehicle moving status changes sequence Modify BTAudio Sequence with request to end Add type of device to heartbeat Added flow for SMS interrupted by phone call
1.5	17Nov2010		Benedict	Add Displays to BT audio flow Adjust message content for Heartbeats Switch order of heartbeats so DC sends First Heartbeat message Add Number of text messages to PhoneInfo message Add DisplayInfo message to flows and message details
1.6	18Nov2010		Benedict	Add LVI sequence Replace message category descriptions with single table Misc comment cleanup in flows.
1.7			Benedict	Remove Power.Initcomplete – not needed because of Heartbeat Added new section 6 with display details Add Info.custeomSMSList.request Message and sequence that uses it. Adjusted some timeouts from 1.5s to 500ms.
1.8			Benedict	Added circuit information in section 2.2 Added additional clarification on removing power after 25 timeout on shutdown sequence.

Revision Level	Date	Section / Page	Author	Description of Revision
1.9			Benedict	Update Block Diagram Add draft pin assignments Add electrical Char Table. Add reference to NDS for UART section. Add more details about UART. Remove Header, Length and CRC fields from each message since they are not needed when using NBus. Removed HU_BT_Audio_interrupt - not needed, will use BT_Permit_requesttostart instead Removed reference to DOW Algorithm section 9 use checksum defined by NBUS. Added reference to NBUS spec. Corrected some message type and category numbers
2.0			Flood	Added Diagnostic messages to the list.
2.1	12Jan2011	65.2 5.3.1 5.186.2.9,5.8, 5.18, 5.19 6.1	Benedict	Change Vehicle.Request for Reset to Power. Request for reset. Changed message category form Vehicle to power for request for reset. Changed PowerInitComplete to Start of heartbeat messages Reversed order of pending and in-progress message, specified 500ms for when pending will be sent. Corrected direction of display messages to be from DC to HU Added UserInput Category type, changed button from Vehicle category to UserInput category. Corrected diagnostic message category to 0x09 instead of 0x08 which is already being used. Changed Vehicle.button to UserInput.button in diagrams Added where used columns to message categories and types
2.2	13Jan11	6.2.8	Mflood	Updated the Diagnostic message format.
2.3				Added a new message UserInput.Menu to Start and End menu context. Added a new message Display.BTMenu to handle the top level settings menu for BT. Added BZ Tune Up, Down and Enter to UserInput.Button. Removed the messages CustomMessageSelection and PhoneListReply from the Display type and moved them to Info types. Changed these messages to send only text data with static tags found in the Voice Prompts document. Updated the “Get List of Paired Phones” in 5.14 to include the changes above and provide alternate flows. SMSInterrupt message, the name length should be one byte instead of two.

Revision Level	Date	Section / Page	Author	Description of Revision
2.4	14Jan	5.15,16,17 6.0	Benedict	Removed these sections, with BT menu items populated by hex values as in section 5.14, these are not needed. Corrected used in table entries for 81,4a,4b,4c, deleted 61, 62 Removed 6.2.6.1, 6.2.6.1
2.5	6Feb2011	6.2.10 6.2.9.1 6.2.7 6.2.6.4 6.2.5 6.2.4.11 6.2.4.10 6.2.4.2,3 6.2.4.1 5.19 5.18 5.15 5.14 5.9 5.8 5.3 5.1 2.5	Benedict	New section for MCAN messages Updated Button definitions Corrected missing state info Added command ID definition for each phone is list Deleted section of setup message - not needed due to strategy change to command ID's for menu's Added display message for 3 line custom text sms replay menu Added talking head icon info Added talking head icon info Added Device info Added MCAN Sequence diagram Added sequence for aux mode – bt Audio mode with no BT audio device connected. BT menu for 10STD – STILL TBD pending Nissan internal discussion Added clarification that menu.end can be sent anytime. Added display.customSMSMenu as explicit possibility during this sequence. New section for SMS with message no read Added Clarification on when audio is granted Added two info messages as part of start up sequence Reworded LVI description based on current agreement with Nissan and HU suppliers
2.6	11Feb2011	2.3 5.3 6.2.10.5 6.2.9.1 6.2.4.10	Benedict	Add details about LVI signal during startup. Add Minimum to T3 time specification Add details about mute for HU and DC Add fields to disc message, Add hold states for PTT and End, change short and long to press and release Add 5th command to message.
2.7	15Feb2011	6.2.9.1 6.2.10.5	Benedict	Change button message to accommodate all bezel buttons distinguish press hold and release events. Corrected missing fields in Disc message

Revision Level	Date	Section / Page	Author	Description of Revision
2.8		6.2.4.10 3.0 6.2.9.1 2.3 6.2.4.5 6.2.4.13	Benedict	Added byte for slidebar indicator used on Right side of menu screen Added Mechanical Drawing Added preset 1, 2,5,6 bezel back to userinput.button. Add second byte for button type Added clarification about when LVI state could be set in startup sequence, C-oil 107 Added waiting and hold status info to callinfo message New message for repeat and random status for BT audio source.
2.9	21Apr11	6.2.8.2.2	Mflood	Update the Negative Response Diagnostic message to return the Parameter ID instead of the Service ID.

10 TcSE changes v2.9 and beyond

10.1 Release 3.0

10.1.1 CQ 21558 Incorrect Message ID for MCAN msgs

A listed instead of B as message type for MCAN messages

10.1.2 CQ 21847 Display Info category correction

Display info category corrected to 6 – listed incorrectly as 3 in table.

10.1.3 CQ 21849 Add Clarity on byte 3 for rotary button presses

Add note saying rotary events up and down are used only with Bezel rotary button type.

10.1.4 CQ21420 UserInput.button byte length change

Button parameter changed from 2 bytes to 1 byte.

10.1.5 CQ 21642 Chime not interrupted by Source change

10.1.6 CQ 21644 message count parameter clarification -- unread messages

Added comment in parenthesis below to message count parameter.

Message count. Range from 0 to 20 {count of unread messages}

10.1.7 CQ 19037 clarification in display categories descriptions

Update section 6.2.4.3 name of category in byte 0, typo change only
Update section 6.2.4.7 clarify meaning of X and Y in reference to message counts

10.1.8 cq 22747 correct start and end value for HF message

Change from one and two to zero and one.

10.1.9 CQ 22847 missing info in interface messages

messages missing info:
Pana oil 121 -- missing text parmater in VRCustomSMSMenu message
Pana Oil 118 - missing Audio.ChimeInterrupt. and ChimePermit messages definition
Pana Oil 116 - added message for BTAudiodisplay
remove extra parameter in BTAudioPlayState

10.1.10 CQ 22760 missing parameter in viewsms

Add byte for read/ignore reply/exit Pana Oil 123

10.1.11 Pana Oil #130

Added need to keep Uart comm. Pins low while Enable is low to prevent back powering of OMAP

10.1.12 CQ21208 UART Byt length missing

Added byte length to last byte of diagnostic messages

10.1.13 Audio Voltage changed to 800mV

10.1.14 CQ24151: Pana Oil 116: Display.BTAudiodisplay listed in flows but no message is defined.

PanaOil116: "Display.BTAudiodisplay" message. In a UART spec, it seems No command specification. Please check it.

The command is mislabled in the flows. The following flows are affected:
Head Unit Requests Bluetooth Audio
BTAudio interrupted by Phone Call
Aux mode – BT Audio mode with no BT device connected

Change the line "Display.BTAudiodisplay \Display.DisplayInfo" to
Display.DisplayInfo
Display.BTAudioMenu
Display.BTAudioMetadata
Display.BTAudioSongPosition

10.1.15 CQ23932: CQPana OIL 136: Add byte for connected phone to Info.PhoneList message

Add a byte to the info.phonelist message to show the currently connected phone.

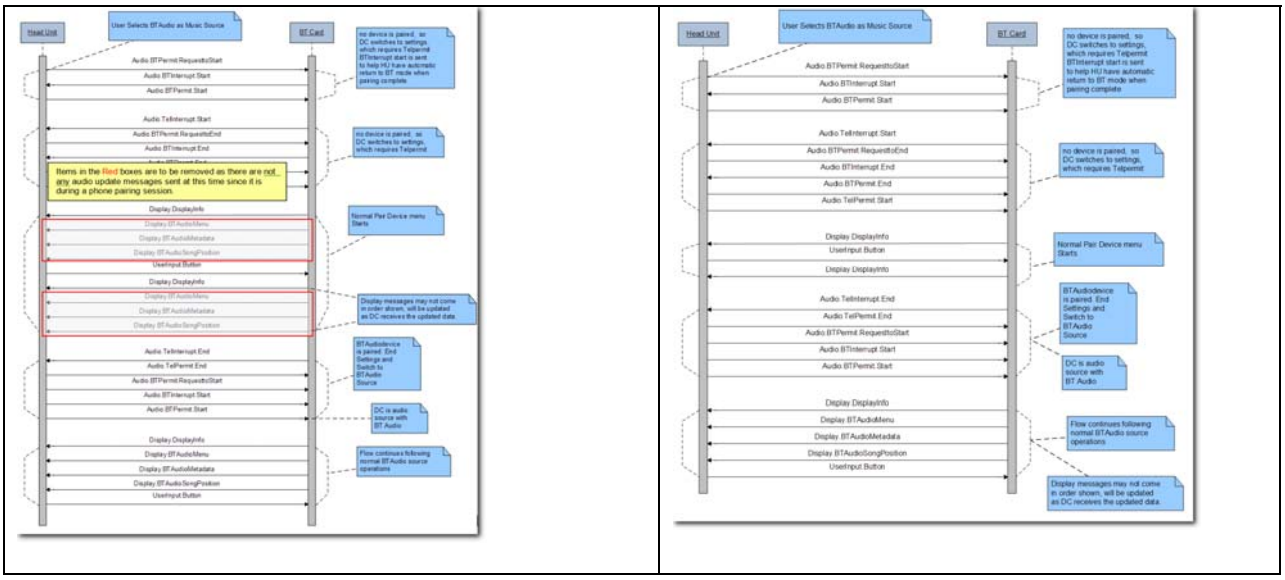
Byte	Field	Val	Description
1	Active Phone	0 - 5	0x00 – There is not a phone currently connected to the system. 0x01 to 0x05 – The index of the phone that is currently connected. This relates to the list below.

10.1.16 CQ 21208 Incorrect sufunction message id

Changed Value to E from D in Val column. It was incorrectly listed as D there, but correct in description. In BTAudioPlayState.

10.1.17 CQ24151: Pana Oil 116: Display msgs update

The current version contains audio messages Display.BTAudioMenu, Display.BTAudioMetaData and Display.BTAudioSongPosition which are not required during Phone pairing.	The updated flow is below:



10.1.18 CQ25476 Startup and Shutdown Enable, Reset and LVI pin behavior

Updated section 2.3 with updated power sequence required for DC to Startup and Shutdown correctly.

Removed section 2.5 as it was not applicable any longer as section 2.3 details the LVI pin behavior.

10.1.19 CQ25471 Heartbeat message update

The Heartbeat message shall only contain the shutdown status of the DC.

10.2 Release 3.1

10.2.1 cq 26217 BTAudioMenu not used

Marked btAudiomenu message as not used in 6.1
and 6.2.4.8

10.2.2 CQ 26210 extra text in event type for Heartbeat message

Removed extra text starting at mf section 6.2.7.1

10.2.3 CQ27272 Pana139, Playstate added to BTAudio status updates

10.2.4 CQ 21917 Reflash Spec Message ID's Added

The specification called “Procedure for Blue Tooth Daughter Card Programming via NBUS.doc” has been placed in Enterproj. The messages have been added to the list to reserve the message ID.

10.2.5 CQ 27528 SMS Flow: Added/Updated Sequences for Settings, ActiveCall and Msg Not Read

These two sequences have the PhoneInfo message added showing how the SMS Message number gets updated on the header.
UART 5.8 SMS Message Sequence, message not read

UART 5.9 SMS Message Sequence, message read
This is probably already in the software but needed to be included for clarity.

Added two sequences to deal with:
UART 5.20 SMS Sequence while the DC is in a Setting Screen
UART 5.21 SMS Sequence wile the DC is in an Active Call

10.2.6 CQ 27267 config error behavior incomplete

Defined Rest of Bits in config.set message for HU to inform DC which HU it is, and defined DC behavior for all possibilities.

Updated initialization sequence for describing default value behavior for DC if config.set isn't 1 or 2.

10.2.7 CQ 25645 additional sequences needed

Correct sequence when BT audio requested, with No BT device connected.

Add sequence for DC disconnecting BT Audio device

Add comments in audio arbitration sequences to clarify similarities in Tel, BT, SMS, and SMSChime interrupt and Permit messages.

10.2.8 CQ 27528 SMS : Added/Upd Sequences for Settings, ActiveCall, BT Audio and Msg Not Read

These two sequences have the PhoneInfo message added showing how the SMS Message number gets updated on the header, a Notes box and the change of where the timer from the HU should start:
UART 5.8 SMS Message Sequence, message not read
UART 5.9 SMS Message Sequence, message read
This is probably already in the software but needed to be included for clarity.

Added these sequences to deal with other unclear behavior:
UART 5.22 SMS Sequence wile the DC is in an Active Call
UART 5.23 SMS Sequence while the DC is in a Setting Screen with BT Audio audio
UART 5.24 SMS Sequence while the DC is in a Setting Screen with CD/Radio audio
UART 5.25 SMS Sequence while the DC is in a BT Audio audio session.

10.2.9 CQ 28083 Pana 162: shorten Audio.SMSInterrupt to match Audio

Removed Name Length, Name and/or Phone Number and Time from the Audio.SMSInterrupt message. This is handled by the display view SMS message.

10.2.10 cQ 28090 slide bar behavior for BT menu values added

Added comment to Display.BTMenu message for Slidebar: (1 is top of menu, e is bottom, if value of 0 sent there should be no menu bar.)

10.2.11 CQ 28232 SMSChimeInterrupt.end behavior documented.

10.2.12 CQ 27848 SMS sequences not explicit for several cases

Added sequence for BT Audio interrupted by SMS message and then the message is read.
Added Sequence for SMS message read/ignore interrupted by phone call.

Corrected 5.12 for DC playing chime.

10.3 Release 3.2

10.3.1 CQ 24001 Pana126,7: BT Menu Back Button

Provide an indicator to the HU of when the top BT menu has been reached.

10.3.2 CQ 29517 REQ: SMS Flows call out incorrect buttons to dismiss SMS popup for Read Request

This was an error in the button definition to act upon the PTT and END buttons to remove the SMS Popup. Only these buttons are acted upon.

10.4 Release 3.3

Document typographical errors fixed:

- "Vehicle.Config.Status" should be sent from DC. The arrow direction was reversed. This is fixed.
- Added the Reset sequence to 2.3.3 that was missing in 3.2.
- Removed unused commands from spec.
- PhoneInfo clarification warning on usage of devices not available.

10.4.1 CQ 29226 implement new byte in Display.BTAudioMetadata

Added AVRCP version selection of 1.0 or 1.3 to byte one of the Display.BTAudioMetadata message.

10.4.2 CQ 28590 Message format to send 5 latest SMS during BT Menu entry is not available

10.4.3 CQ 29915 UART: Need configuration ID for Panasonic Bose for EQ picking at startup

Panasonic Bose will have a Vehicle.Config.Set value of 0x03.

10.4.4 CQ 30093 0x01 not defined as text type in aw message

10.4.5 CQ 30657 add clarity on timing of MCAN messages

10.4.6 CQ 31381 BTAudioMenu message should be removed from sequence

Section 5.16 message removed from:
Head Unit Requests Bluetooth Audio
DC Ends BT Audio
BTAudio interrupted by Phone Call
BT Audio Interrupted by PTT press to start VR session
BT Audio to VR session Via BT Menu

10.4.7 CQ 30522 Add the Play Pause status message

The command was added to the following sequences with the display messages:
Head Unit Requests Bluetooth Audio
DC Ends BT Audio
BTAudio interrupted by Phone Call

BT Audio Interrupted by PTT press to start VR session
BT Audio to VR session Via BT Menu

10.4.8 CQ31420 REQ: UART Display.ViewSMS references wrong number in variable

The Display.ViewSMS referenced an out of range value of 3 for Day.month.unused.
It is defined as 2. This is a documentation change as the sw correctly implemented the range.

10.4.9 CQ 32462 BT Audio interrupted by Add phone in BT menu

10.4.10 CQ 33109 (33070, 33244, 32998, 31663) MCAN Behavior Update

Added section to the UART spec with the information culled from Nonomura-san.
Updated MCAN Sequence to reflect the behavior in this section.

10.4.11 CQ 3946 Display.ReadSMS - No such mesaage applicable for BT CARD

Changed in
6.1 Message details
6.2.1.5 Audio.SMSInterrupt

10.4.12 CQ 32658 Reflash Timing has changed Initialization Time

Initialization Sequence has been updated with the new timing required from the changes made due to the addition of reflash capability.

The Language Change Sequence has been removed from the Initialization Sequence and made stand alone.

10.4.13 CQ 34519 Clar148 HU beh if DC not reply to HU req DC to stop BT Audio

Added sequence “DC does not reply to message to stop playing BT Audio” per agreed upon behavior.

10.5 Release 3.4

Updated the Initialization Sequence to reference the Mismatched Baud Rate section of the DC Error Recover 1.3 and greater document.

10.5.1 CQ 35573 Display clarification for CallInfo message

10.5.2 CQ 33070 MCAN: BT Audio Not Available Disc message to be sent

Added section to MCAN Behavior Disc to indicate that a message is sent when there a BT Audio source that is playing becomes unavailable of if the HU attempts to start a BT Audio session when there is not a compatible device connected to the DC.

10.5.3 CQ 35580 MCAN: Disc message sent incorrectly

Added the text to MCAN Disc messaging that updates are with Interrupt Disabled as they are not user directed actions. For clarity only.