Infrared Data Association

‘IrCOMM’: Serial and Parallel Port Emulation over IR (Wire Replacement) (IrCOMM) Compliance Tests

Version 1.0

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1 Introduction

1.1 Purpose

This document specifies the test guideline used to verify an IrCOMM device. The goal of this document is to ensure interoperability between various IrCOMM devices and products.

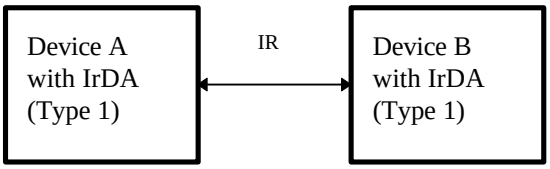
1.2 Scope

The tests described in this document do not verify the lower layers of the IrDA stack. They target only the IrCOMM application layers.
The applications supported by an IrCOMM device include one or more of the following:

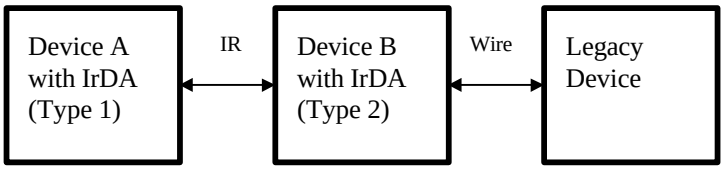
- 3-Wire Raw (or IrLPT)
- 3-Wire
- 9-Wire
- Centronics

This document does not contain a description of Centronics emulation.

1.3 Device Types



A type 1 device is inspected by monitoring the transmission and reception of IrCOMM packets in the infrared beam. The state of the control signals is often communicated through a high level API. Wherever possible, these API's can be used to examine the control signal state changes.



A device of type 2 is tested by examining both the IrCOMM packets sent over the infrared beam, and by examining the states of the control signals on the wire.

1.4 Signal Group

1.4.1 3-Wire Signals

The following EIA/TIA-232-E signal lines must be inspected on an IrCOMM 3-Wire Device.

102	Signal Common	This circuit is not needed for IR but is shown because it is one of the circuits that drove the definition of the name.
103	Transmitted Data (TD)	This circuit carries data transmitted by the DTE
104	Received Data (RD)	This circuit carries data received by the DTE

1.4.2 9-Wire Signals

The following EIA/TIA-232-E signal lines must be inspected on an IrCOMM 9-Wire device.

105	Request to Send (RTS)
106	Clear to Send (CTS)
107	Data Set Ready (DSR)
108/2	Data Terminal Ready (DTR)
109	Data Channel Received line signal detector (RLSD), a.k.a. Carrier Detect (CD)
125	Calling indicator, a.k.a. Ring Indicator (RI)

1.5 References

The following documents are available from the IrDA ftp site The IrCOMM specification should be read in conjunction with **all** of the errata documents.

[TIA232]	EIA/TIA-232-E (July 1991), “Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange”.
[ITU-TV24]	ITU-T V.24 (BB 8.1, 1988), “List of Definitions for Interchange Circuits between Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE)”
[IEEE1284]	IEEE Std 1284-1994, “IEEE Standard Signaling Method for a Bi-directional Parallel Peripheral Interface for Personal Computers”.
[ITU-TV.110]	ITU-T Recommendation V.110 "Support of data terminal equipment (DTEs) with V-series type interfaces by an integrated services digital network (ISDN) "
[ITU-TV.42]	ITU-T Recommendation V.42 "Error-Correcting Procedures for DCEs Using Asynchronous-to-synchronous Conversion"
[IrCOMM]	Infrared Data Association, ‘IrCOMM’: Serial and Parallel Port Emulation over IR(Wire Replacement) (IrCOMM)”, Version 1.0 7th November 1995
[IAS]	Infrared Data Association, “IrLMP Service Hint Bit Assignments and Known IAS Definitions”, Version 1.0a 13th July1996
[IrPHY]	Infrared Data Association Serial Infrared Physical Layer Link Specification, IrPHY, Version 1.2
[TinyTP]	Infrared Data Association, ‘TinyTP’:A Flow-Control Mechanism for use with IrLMP ,Version 1.1 20th October 1996

2 Environment

2.1 Hardware

The following list includes examples of the type of hardware that is required:

- Device Under Test (DUT)
- PC or another device to generate test frames.(IrDA Test Equipment)
- EIA/TIA-232-E signal line Monitor/Generator (for Type 2 Device)
- IR Frame Monitor for tracing low level IR frames

2.2 Software

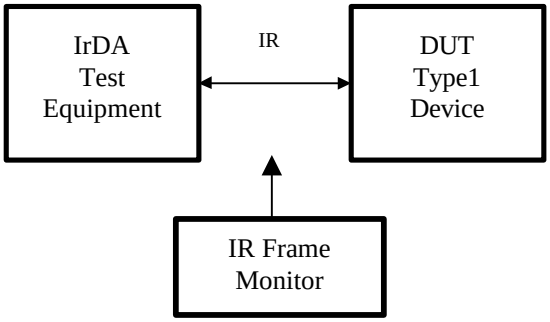
The following list includes examples of the type of software that is required:

- Source of IrCOMM frames. Windows9X has virtual COM ports, but Windows9X supports only the 9-Wire and IrLPT services.
- IrCOMM Test program (PC) or Built in Test programs (IrDA Test Equipment).

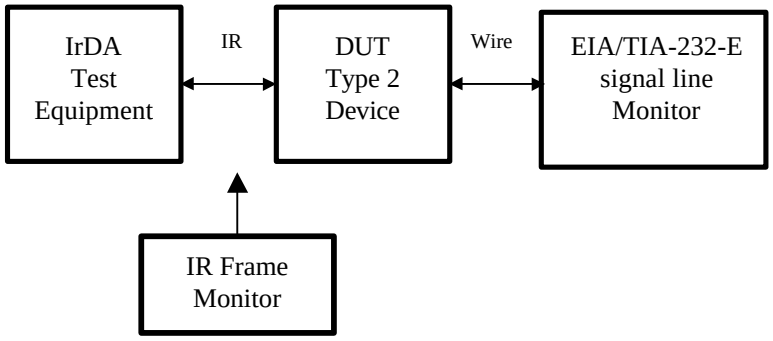
2.3 Typical Test Environment

The following figure includes examples of the type of typical test environment.

Type-1 Device Test Environment



Type-2 Device Test Environment



Type 2 Device Test Environment

3 Overview Compliance Tests

The test scenarios assume that the device under test is an IrCOMM or IrTA device, and that the tester is software running on an IrCOMM frame generator.

3.1 What Tests Apply to Your Product?

The IrCOMM specification defines various applications (Type-1, Type-2, IrTA, Camera, etc.) and levels of support. The tests that your product must pass depend on the level of support that your product offers. See the following sections.

3.1.1 Initiator/Responder

The Initiator is the station that initiates the IrCOMM connection. The Responder is the station that accepts requests for the IrCOMM connection. The tests have been named according to whether the device is acting as Initiator or Responder.

IrCOMM_I_xxx Initiator (initiates the connection for data transfer)
IrCOMM_R_xxx Responder (responds to requests for data transfer)
IrCOMM_A_xxx Initiator/Responder common test items.

3.1.2 IrCOMM Protocol Levels

As defined in IrCOMM, data and line signals can be exchanged through three different emulation types: 3-Wire Raw (or IrLPT) emulation, 3-Wire emulation and 9-Wire emulation.

The tests have been named according to the level being verified.

IrCOMM_X_LPT_xx	IrLPT printer emulation
IrCOMM_X_3R_xx	3-Wire-Raw emulation
IrCOMM_X_CK_xx	Cooked Mode as 3-Wire and 9-Wire mode
IrCOMM_X_9W_xx	9-Wire emulation
IrCOMM_X_COM_xx	IrCOMM IAS class devices

3.2 General Test Steps

The majority of the tests involve transferring data streams and DTE/DCE controls signals between the device under test and the IrDA test equipment. The following steps should be performed.

1. Switch on the device under test, and activate the IR port if appropriate.
2. Switch on the IrDA test equipment.
3. Point the IrDA ports at each other. Ensure that they are within the operating distances defined for the devices.
4. Generate an IAS *Get Value By Class* request from the device. There are some types of Class and Attribute. Choice one of them.
   (4_CK) For a serial emulation (used by 3-Wire or 9-Wire) device, Generate an IAS

Get Value By Class request from the device, for the *IrCOMM* class, and attribute *IrDA:TinyTP:LsapSel*. If the test is a responder test, then the tester should make the request.
(4_3R) For a printer or serial device (used by 3-Wire Raw), generate an IAS *Get Value By Class* request from the device for the *IrCOMM* class and attribute *IrDA:IrLMP:LsapSel*. If the test is a responder test, then the tester should make the request.
(4_LPT) For a printer device (used by IrLPT), generate an IAS *Get Value By Class* request from the device for the *IrLPT* class and attribute *IrDA:IrLMP:LsapSel*. If the test is a responder test, then the tester should make the request.

5. Make a connection from the device to the LSAP returned in the response to the *Get Value By Class* request. If the test is a responder test, then the tester should make the connection.
6. Generate the IrCOMM Data/Control requests from the IrDA test equipment or device under test.
7. Verify that the data was transferred without any problems.

4 Protocol Tests

These tests are mandatory for all devices with IrCOMM.

4.1 Discovery Hint Bits

A device **must have** the following service hints if it advertises the IAS class name IrCOMM. (IrLAP Discovery PDU)

Byte 2	
Bit	Function
8	
9	
10	IrCOMM (Set)
11	
12	
13	
14	
15	

If a device advertises the IAS class name IrLPT, then the following hint bit must be set.

Byte 1	
Bit	Function
0	
1	
2	
3	IrLPT (Set)
4	
5	
6	
7	

4.1.1 Initiator

IrCOMM_I_COM_HINT_1 (Mandatory if the device checks the IrCOMM Hint Bits)

1. Configure the Tester so that it sets the IrCOMM Hint Bit
2. General Test Steps 1-3
3. Perform Discovery from the Device.
4. Verify that the device correctly decodes the hint bit.

IrCOMM_I__LPT_HINT_1 (Mandatory if the device checks the IrLPT Hint Bits)

5. Configure the Tester so that it sets the IrLPT Hint Bit
6. General Test Steps 1-3
7. Perform Discovery from the Device.
8. Verify that the device correctly decodes the hint bit.

4.1.2 Responder

IrCOMM_R_COM_HINT_1 (Mandatory if Connection IrCOMM)

1. General Test Steps 1-3
2. Initiate Discovery from the Tester.
3. Verify that the IrCOMM Hint Bit is set in the hint bits returned by the device (see the IAS specification [IAS].)

IrCOMM_R_LPT_HINT_2 (Mandatory if Connection IrLPT)

4. General Test Steps 1-3
5. Initiate Discovery from the Tester.
6. Verify that the IrLPT Hint Bit is set in the hint bits returned by the device (see the IAS specification [IAS].)

4.2 IAS Entries

4.2.1 IrCOMM or IrLPT IAS entry

IrCOMM IAS entry must have classname IrDA:IrCOMM , and at least the following attributes: LsapSel.
And IrLPT IAS entry must have classname IrLPT , and at least the following attributes: LsapSel.

(The Parameters Attribute is also required. See Section 6.2.2. Only Service Type is required, however)

4.2.2 LsapSel Attribute

If the IrDA:IrCOMM IAS entry is for one or more of the cooked service types (3-Wire, 9-Wire, or Centronics), use the following format.

Attribute Name	Value Type	Description
IrDA:TinyTP:LsapSel	Integer (0x01)	The IrLMP LSAP/TTPSAP of the TTP entity that provides access to the service being advertised Legal values are restricted to the range 0x01-0x6F.

On the other hand, if the IrDA:IrCOMM IAS entry is for 3-Wire raw, use this format instead.

Attribute Name	Value Type	Description
IrDA:IrLMP:LsapSel	Integer (0x01)	The IrLMP LSAP of the service being advertised Legal values are restricted to the range 0x01-0x6F.

If the IrLPT IAS entry is for Simple Printer, use the following format.

Attribute Name	Value Type	Description
IrDA:IrLMP:LsapSel	Integer (0x01)	The IrLMP LSAP of the service being advertised Legal values are restricted to the range 0x01-0x6F.

LsapSel (Link Service Access Point Selector) is the unique “address” or id of the service within the context of one device, and is needed to connect to that service. Use of **this attribute is mandatory by IrCOMM or IrLPT.**

4.2.3 Initiator

IrCOMM_I_CK_IAS_1 (Mandatory 3Wire or 9Wire as initiator)

1. General Test Steps 1-3
2. Make an IAS connection from the Device
3. Generate an IAS *Get Value By Class* request from the device, for the ***IrDA:IrCOMM*** class, and attribute ***IrDA:TinyTP:LsapSel***.
4. Verify that the device correctly decodes the integer value returned for the LSAP of the IrCOMM (cocked mode) connection on the Tester.

IrCOMM_I_3R_IAS_1 (Mandatory 3-Wire-Raw as initiator)

1 General Test Steps 1-3
2 Make an IAS connection from the Device
3 Generate an IAS *Get Value By Class* request from the device, for the ***IrDA:IrCOMM*** class, and attribute ***IrDA:IrLMP:LsapSel***.
4 Verify that the device correctly decodes the integer value returned for the LSAP of the IrCOMM (3-Wire raw) connection on the Tester.

IrCOMM_I_LPT_IAS_1 (Mandatory IrLPT as initiator)

5 General Test Steps 1-3
6 Make an IAS connection from the Device
7 Generate an IAS *Get Value By Class* request from the device, for the ***IrLPT*** class, and attribute ***IrDA:IrLMP:LsapSel***.
8 Verify that the device correctly decodes the integer value returned for the LSAP of the IrLPT (3-Wire raw) connection on the Tester.

4.2.4 Responder

IrCOMM_R_CK_IAS_1 (Mandatory 3-Wire or 9-Wire as Responder)

1. General Test Steps 1-3
2. Make an IAS connection from the Tester
3. Generate an IAS *Get Value By Class* request from the tester, for the ***IrDA:IrCOMM*** class, and attribute ***IrDA:TinyTP:LsapSel.***
4. Verify that the IAS data received contains the integer value for the LSAP of the IrCOMM (cocked mode) connection within the device.

IrCOMM_R_3R_IAS_1 (Mandatory 3-Wire-Raw as Responder)

1. General Test Steps 1-3
2. Make an IAS connection from the tester
3. Generate an IAS *Get Value By Class* request from the tester, for the ***IrDA:IrCOMM*** class, and attribute ***IrDA:IrLMP:LsapSel***.
4. Verify that the IAS data received contains the integer value for the LSAP of the IrCOMM (3-Wire raw mode for printer / serial) connection within the device.

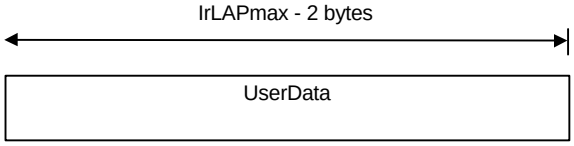
IrCOMM_R_LPT_IAS_1 (Mandatory IrLPT (3-Wire-Raw) as Responder)

5. General Test Steps 1-3
6. Make an IAS connection from the tester
7. Generate an IAS *Get Value By Class* request from the tester, for the ***IrLPT*** class, and attribute ***IrDA:IrLMP:LsapSel***.
8. Verify that the IAS data received contains the integer value for the LSAP of the IrLPT (3-Wire raw mode for IrLPT) connection within the device.

4.3 Frame Formats

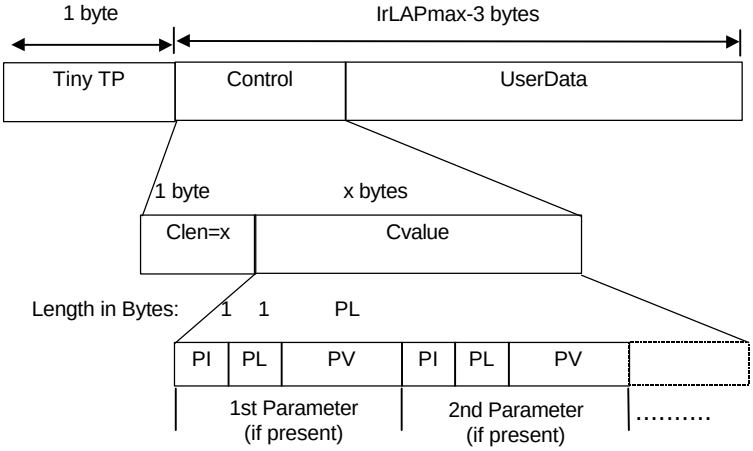
4.3.1 3-Wire (IrLPT) Raw Frame Format

IrCOMM frames fit directly into the UserData field of IrLMP or TinyTP packets, which are based on the packet size that IrLAP computes (IrLAPmax) after negotiating the link. 3-Wire raw uses a very simple frame format, consisting of nothing but user data.



4.3.2 Cooked (3-Wire and 9-Wire) Frame Format

Now compare that with the data given to IrLMP for the cooked service cases:



The cooked service cases have user data, just as with raw, but precede the user data with two elements. The first element is one byte added by Tiny TP to carry credits to the other side and is not really part of the IrCOMM frame format. **It should be noted that IrCOMM does not use the segmentation and reassembly (SAR) capabilities of TinyTP (MaxSduSize = 0)**. Thus, Connect and Connect Confirm TTP-PDUs do not contain a TTP parameters field (only the initial credit byte is present in these PDUs). The second element is the **control channel**, consisting of the control length byte and (optionally) some control data. The control channel is truly part of the IrCOMM frame format. The control length byte holds the length (Clen) of the control data (Cvalue). The control data (if Clen > 0) immediately follows the control byte (Note: Clen is required even if there is no control data). All remaining bytes, if any, are user data. This mechanism allows control and data to exist in the same packet.

4.4 IrCOMM Connection procedure(3-Wire or 9-Wire)

4.4.1 Service type

In IrCOMM connection procedure, initial control parameter is forwarded to TTP-SDU.
In service type parameters, the following parameters must be contained.
(Service type is only required if the highest bit set in the IAS Service Type parameter is not the service desired. In that case, the service type parameter must be sent to specify the desired service.Port Type is an optional parameter according to section 6.2.2.It may also be important to state that this parameter must be sent before any other control

parameters or data).

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x00	Service Type	1	Byte (bitmask) bit 0 bit 1 bit 2 bit 3	 3-Wire raw 3-Wire 9-Wire Centronics	default = highest order bit set in the IAS service type parameter
0x01	Port Type	1	Byte (bitmask) bit 0 bit 1	 Serial Parallel	default = both set

A device should refuse connection if it receives a service type that it cannot support. The parameter is ignored if an undefined service type parameter is received.

4.4.2 Initial Control Parameters(3-Wire or 9-Wire)

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x10	Data rate	4	UINT32, Big-Endian	data rate in Bits/second	undefined
0x11	Data Format	1	Byte bits 0 – 1 bit 2 bit 3 bits 4 – 5	 Character Length 00 = 5 bits 01 = 6 bits 10 = 7 bits 11 = 8 bits Stop Bits 0 = 1 stop bit 1 = 2 if char len 6,7,8 1.5 if char len 5 Parity Enable 0 = no parity 1 = parity enabled Parity Type (if enabled) 00 = odd 01 = even 10 = mark 11 = space	8 bits, 1 stop bit, no parity
0x13	XON/XOFF Flow control characters	2	byte sequence - XON character is first, followed by XOFF character	characters used to represent XON/XOFF	XON - 0x11 XOFF - 0x13
0x14	ENQ/ACK Flow control characters	2	byte sequence - ENQ character is first, followed by ACK character	characters used to represent ENQ/ACK	ENQ - 0x05 ACK - 0x06

You should notify you of the control line states of a device from initial service parameters if possible. An above-mentioned parameter is the parameter that should be exchanged for type 2 device (both 3-wire and 9 wire devices). And type 2 device of 9-Wire should exchange the more following parameters.
An above-mentioned parameter is the parameter that should be indicating to client application for type 1 device.

4.4.3 Initial Control Parameters(9-Wire Only)

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x20	DTE Line Settings and Changes	1	Bit mask bit 0 bit 1 bit 2 bit 3	 Delta DTR Delta RTS DTR State RTS State	Delta 0 = circuit not changed 1 = circuit changed State 0 = state is low 1 = state is high
0x21	DCE Line Settings and Changes	1	Bit mask bit 0 bit 1 bit 2 bit 3 bit 4 bit 5 bit 6 bit 7	 Delta CTS Delta DSR Delta RI Delta CD CTS State DSR State RI State CD State	Delta 0 = circuit not changed 1 = circuit changed State 0 = state is low 1 = state is high

It is ignored when received the initial control parameters these ware not defined with IrCOMM.

4.4.4 Initiator

IrCOMM_I_CK_CONN_1 (Mandatory 3-Wire or 9-Wire)

1. General Test Steps 1-4_CK
2. Generate an IrCOMM connection request PDU from the DUT.
3. Verify that the IrCOMM Connection PDU from the DUT is received correctly on the tester. The TTP connection PDU should note that IrCOMM does not use the segmentation and reassembly (SAR) capabilities of TinyTP (MaxSduSize = 0). And verify Service Type.
4. If Tester sent an IrCOMM Connection PDU with some initial control parameters, In case of Type-1 device, verify that the Device API must reflect line control status according to the tester. In case of Type-2 device, verify that the Device IEA-232-E line signals must change according to tester. This item is optional.
5. If tester received some initial control parameters from the DUT, the received connection PDU must be according to the Type-1 API line status setting or the IEA-232-E line signals of the Type-2 device. This item is optional.

4.4.5 Responder

IrCOMM_R_CK_CONN_1 (Mandatory 3-Wire or 9-Wire)

1. General Test Steps 1-4_CK
2. Generate an IrCOMM connection request PDU from the Tester.
3. Verify that the IrCOMM Connection PDU is received correctly on the tester (Same as IrCOMM_I_CK_CONN_1 test case.)
4. If tester received some initial control parameters from the DUT, the received connection PDU must be according to the Type-1 API line status setting or the IEA-232-E line signals of the Type-2 device. This item is optional.

4.5 Control data Tests

4.5.1 Receiving a undefined control parameter

It is ignored when received the initial control parameters these ware not defined with IrCOMM.

IrCOMM_A_CK_CONTROL_1 (Mandatory 3-Wire or 9-Wire)

1. General Test Steps 1-4_CK,5
2. Generate an undefined control (examples: PI=0xff,PL=0x01,PV=0x01) from the tester.
3. DUT must ignore this control.

4.5.2 Send Break

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x16	Break	1	Bit mask bit 0	Break 0 = Clear break 1 = Set break	sender signals break state

If detect break signal then Break bit must set to 1.If release break signal then Break bit must set to 0.

IrCOMM_A_CK_CONTROL_2 (optional 3-Wire or 9-Wire)

1 General Test Steps 1-5
2 Generate a Send-break control (PI=0x16,PL=1,PV=1) from the tester.
3 In case of Type-1 device, verify that the device API must indicate break on control status according to tester. In case of Type-2 device, verify what the device IEA-232-E TD line must change break on state according to tester.
4 Generate a Send-break control (PI=0x16,PL=1,PV=0) from the tester.
5 In case of Type-1 device, verify that the device API must indicate break off control status according to the tester. In case of Type-1 device, verify that device IEA-232-E TD line must change break off state according to the tester.
6 In case of Type-1 device, request send-break by the device API. In case of Type-2 device, turn the RD line of the device into break-state.
7 Verify received IrCOMM control from the DUT.
8 In case of Type-1 device, request release-break by the device API. In case of Type-2 device, turn the RD line of the device into normal-state.
9 Verify received IrCOMM control from the DUT.

4.5.3 Baud Rate Setting

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x10	Data rate	4	UINT32, Big-Endian	data rate in Bits / second	undefined

IrCOMM_A_CK_CONTROL_3 (optional 3-wire or 9-wire)

1 General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-5). Example PV=9600,19200,38400….
2 Generate a Data-Rate control with a testing speed (PI=0x10,PL=04,PV=nnnn) from the tester.
3 In case of Type-1 Device, verify what the device API must indicate Data-Rate control according to Data-Rate control of the tester. In case of Type-2 device, verify what Data-Rate of IEA-232-E data-lines must set according to Data-Rate control from the tester.
4 Request Data ‘0x00, 0xff, 0xaa,and 0x55’ from the tester.

5 In case of Type-1 device, verify that the device API must indicate data according to the tester. In case of Type-2 device, verify data of TD (IEA-232-E) according to the tester.

IrCOMM_A_CK__CONTROL_4 (optional 3-Wire or 9-Wire)

1 General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-5). Example data rate: 9600,19200,38400 and more.
2 Change Data-Rate from the DUT (used by device API or device setting).
3 Compare received data-rate control of IrCOMM-SDU with DUT data-rate.
4 Generate Data:'0x00, 0xff, 0xaa,and 0x55' from the DUT (used by device API or the IEA-232-E signal generator).
5 Verify Received IrCOMM SDU according to data of the DUT.

4.5.4 Data Format Setting

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x11	Data Format	1	Byte bits 0 – 1 bit 2 bit 3 bits 4 – 5	 Character Length 00 = 5 bits 01 = 6 bits 10 = 7 bits 11 = 8 bits Stop Bits 0 = 1 stop bit 1 = 2 if char len 6,7,8 1.5 if char len 5 Parity Enable 0 = no parity 1 = parity enabled Parity Type (if enabled) 00 = odd 01 = even 10 = mark 11 = space	bits, 1 stop bit, no parity

IrCOMM_A_CK__CONTROL_5 (optional 3-wire or 9-wire)

1. General Test Steps 1-5. And repeat itself about data format to need the following sequences (2-6).
2. Request Data Format control (PI=0x11,PL=1,PV=nn) from the tester.
3. In case of Type-1 device, verify that Type-1 device API must indicate Data-format control according to Data Rate control of the tester.
4. Request Data '0x00, 0x7f, 0x2a and 0x55' from the tester.
5. In case of Type-1 device, verify that device API must indicate data according to the tester. In case of Type-2 device, verify data format and data (from TD) according to the tester.
6. Request Data '0x00, 0xff, 0xaa and 0x55' from the DUT (used by API or IEA-232-E signal generator).
7. Verify received data of the IrCOMM SDU from the DUT.

IrCOMM_A_CK__CONTROL_6 (optional device 3-Wire or 9-Wire)

1. General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-6).
2. Change Data Format by the device API or the device setting of the DUT.
3. Verify Received data-rate control of IrCOMM PDU.
4. Request Data '0x00, 0x7f, 0x2a,and 0x55' from the DUT.
5. Verify Received data according to the DUT.

4.5.5 Line Control and changes and polling

DTE Line Settings and Changes

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x20	DTE Line Settings and Changes	1	Bit mask bit 0 bit 1 bit 2 bit 3	 Delta DTR Delta RTS DTR State RTS State	Delta 0 = circuit not changed 1 = circuit changed State 0 = state is low 1 = state is high

Change DTR line: DTR State bit must set to line level and Delta DTR bit must be set.
Change RTS line: RTS State bit must set to line level and Delta RTS bit must be set.

DCE Line Settings and Changes

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x21	DCE Line Settings and Changes	1	Bit mask bit 0 bit 1 bit 2 bit 3 bit 4 bit 5 bit 6 bit 7	 Delta CTS Delta DSR Delta RI Delta CD CTS State DSR State RI State CD State	Delta 0 = circuit not changed 1 = circuit changed State 0 = state is low 1 = state is high

Change CTS line: CTS State bit must set to line level and Delta CTS bit must be set.
Change DSR line: DSR State bit must set to line level and Delta DSR bit must be set.
Change RI line: RI State bit must set to line level and Delta RI bit must be set.
Change CD line: CD State bit must set to line level and Delta CD bit must be set.

4.5.6 Polling control parameter (9-wire)

Poll for Line Settings

PI	PI name	PL	PV data type	PV Description	PV Default value, notes
0x22	Poll for Line Settings	0	no data		sender requests line settings and changes. Can be sent by either DTE or DCE.

DTE: transmit current DTE line status by PI=20.
DCE: transmit current DCE line status by PI=21.
Delta bits must be set in 0

4.5.7 DCE device

IrCOMM_A_9W_CONTROL_1 (optional 9-wire)

1. General Test Steps 1-5. And repeat itself about data format to need the following sequences (2-3).For example : DTR: on/off, RTS: on/off …
2. Request DTE line setting control from the tester (PI=0x20,PL=1,PV=nn)
3. In case of Type-1 device, verify that the device API must indicate DTE line status control according to the tester. In case of Type-2 device, verify that the DTE control lines must be according to the tester.

IrCOMM_A_9W_CONTROL_2 (optional 9-Wire)

1. General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-3). For Example: CTS: on/off, DSR: on/off, CI on/off, CD on/off…
2. Change the DCE line status by Type-1 API or Type-2 DCE lines of the DUT.
3. Verify that the control (PI=0x21) from the DUT must be according to the current device line status.

IrCOMM_A_9W_CONTROL_3 (optional 9-Wire)

1. General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-3) (Same as IrCOMM_A_9W_CONTROL_2.)
2. Request poll for line setting control (PI=0x22) from tester.
3. Verify that the control (PI=0x21) from DUT must be according to the current device line status.

4.5.8 DTE device

IrCOMM_A_9W_CONTROL_4 (optional 9-wire)

1. General Test Steps 1-5. And repeat itself about data format to need the following sequences (2-3). For example: CTS: on/off, DSR: on/off, CI on/off ,CD on/off…
2. Request DCE line setting control (PI=0x21,PL=1,PV=nn) from the tester.
3. In case of Type-1 device, verify Type-1 device API must indicate DCE line status control according to tester. In case of Type-2 device, verify DCE control lines must be according to tester.

IrCOMM_A_9W_CONTROL_5 (optional 9-Wire)

1. General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-3). For Example: DTR: on/off, RTS: on/off …
2. CTS: on/off, DSR: on/off, CI on/off, CD on/off…
3. Change DCE line status of the DUT (Type-1use API or Type-2: change DCE lines).
4. Verify control (PI=0x21) from DUT must be according to current device line status.

IrCOMM_A_9W_CONTROL_6 (optional 9-Wire)

1. General Test Steps 1-5. And repeat itself about data rate to need the following sequences (2-3) (Same as IrCOMM_A_9W_CONTROL_5.)
2. Request Poll-for-line-setting control (PI=0x22) from the tester.
3. Verify control (PI=0x20) from DUT must be according to current device line status.

IrCOMM_A_9W_CONTROL_7 (optional 9-wire NULL modem connection)

This test item is emulation of NULL modem. Cf. [IRCOMM 10.6]

Set local CTS according to incoming RTS.

Set local DSR CD and RI according to incoming DTR.

1. General Test Steps 1-5. And repeat itself about data format to need the following sequences (2-3). (Same as IrCOMM_A_9W_CONTROL_5.)
2. Request DTE-line-setting control (PI=0x20,PL=1,PV=nn) from the tester.
3. In case of Type-1 device, verify that Type-1 device API must indicate DCE line status control according to tester. In case of Type-2 device, verify that the DCE control lines must be according to tester.

5 Test Result Template

Testing DATE:	**Testing Environments**
DUT(Device Under Test)	**Test Tools or System:**
Product Company:	
	Hard Ware:
Product Model:	
Product Revision:	
	Software:
Product Sample Serial No.	
Remarks:	

Test Name	Pass/Fail	Comments
IrCOMM_I_COM_HINT_1		
IrCOMM_I_LPT_HINT_1		
IrCOMM_R_COM_HINT_1		
IrCCOM_R_LPT_HINT_1		
IrCOMM_I_CK_IAS_1		
IrCOMM_I_3R_IAS_1		
IrCOMM_I_LPT_IAS_1		
IrCOMM_R_CK_IAS_1		
IrCOMM_R_3R_IAS_1		
IrCOMM_R_LPT_IAS_1		
IrCOMM_A_CK_CONTROL_1		
IrCOMM_A_CK_CONTROL_2		
IrCOMM_A_CK_CONTROL_3		
IrCOMM_A_CK_CONTROL_4		
IrCOMM_A_CK_CONTROL_5		
IrCOMM_A_CK_CONTROL_6		
IrCOMM_A_9W_CONTROL_1		
IrCOMM_A_9W_CONTROL_2		
IrCOMM_A_9W_CONTROL_3		
IrCOMM_A_9W_CONTROL_4		
IrCOMM_A_9W_CONTROL_5		
IrCOMM_A_9W_CONTROL_6		
IrCOMM_A_9W_CONTROL_7		