Characteristics of Transfix leased link service access interfaces

Summary: This document gives a brief description of the Transfix and Transfix 2.0 leased link services, and describes the technical characteristics of the interfaces used for accessing these services.

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France Telecom further points out users' attention on the following points:
1. timer values are indicative and can be subject to modification,
2. due to various technical constraints, some services or service options may not be available on some interfaces,
3. the fact that a service not yet commercially open is described in this document can in no case be considered as a binding commitment on France Telecom part to actually open this service.
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1. OVERVIEW

Transfix and Transfix 2.0 are bidirectional digital leased link service lines. These links support, on standardised interfaces, the low, medium and high rates given below.

Interfaces offered for each service according to the rate:

<table>
<thead>
<tr>
<th>Low rate</th>
<th>Medium rate</th>
<th>High rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 – 19.2 kbit/s</td>
<td>64 kbit/s</td>
<td>128 kbit/s</td>
</tr>
<tr>
<td>Transfix V.24/V.28</td>
<td>Transfix V.35 - V.36</td>
<td>Transfix X.24/V.11</td>
</tr>
<tr>
<td></td>
<td>Transfix X.24/V.11</td>
<td>Transfix X.24/V.11</td>
</tr>
<tr>
<td></td>
<td>Transfix G.703/G.704</td>
<td>Transfix G.703</td>
</tr>
<tr>
<td></td>
<td>Transfix 2.0 X.24/V.11</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transfix 2.0 V.35 - V.36</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transfix 2.0 G.703-64 kbit/s</td>
<td>Transfix 2.0 G.703/G.704</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transfix 2.0 Multichannel G.703/G.704</td>
</tr>
</tbody>
</table>

Data Terminal Equipment (DTE): The equipment that transmits or receives data (router, multiplexer, automatic branch exchange, computer equipment, etc.).

Data Circuit terminating Equipment (DCE): The equipment supplied, installed and maintained by France Telecom to which the DTE is connected.

France Telecom holds the customer responsible for ensuring that the premises on which link termination points are installed are suitably fitted out, regardless of who owns these premises.

The connecting cable between the DTE and the connection interface is supplied by the customer.
### Summary of interface characteristics

<table>
<thead>
<tr>
<th>Common name</th>
<th>Characteristics</th>
<th>Standardised name</th>
<th>Signalling management</th>
<th>Services and rates available</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2048 kbit/s</strong>&lt;br&gt;G.703</td>
<td>G.703 ETS 300 166</td>
<td>G.703 ETS 300 166</td>
<td>2 foiled symmetrical pairs</td>
<td>G.703</td>
</tr>
<tr>
<td><strong>Multichannel</strong>&lt;br&gt;G.703/G.704</td>
<td>G.704 ETS 300 167</td>
<td>G.703 ETS 300 166</td>
<td>Sub-D 9-pin</td>
<td>Multichannel G.703/G.704</td>
</tr>
<tr>
<td><strong>V.36</strong></td>
<td>V.24</td>
<td>V.11, V.10</td>
<td>ISO 4902 37-pin</td>
<td>V.24/V.11, V.10</td>
</tr>
<tr>
<td><strong>V.35</strong>&lt;sup&gt;1&lt;/sup&gt;</td>
<td>V.24</td>
<td>V.11, V.10</td>
<td>ISO 2593 34-pin</td>
<td>V.24/V.11, V.10</td>
</tr>
<tr>
<td><strong>64 kbit/s</strong>&lt;br&gt;G.703</td>
<td>G.703</td>
<td>G.703</td>
<td>Termination or connecting strip</td>
<td>64 kbit/s G.703</td>
</tr>
<tr>
<td><strong>V.24/V.28</strong></td>
<td>V.24</td>
<td>V.28</td>
<td>ISO 2110 25-pin</td>
<td>V.24/V.28</td>
</tr>
</tbody>
</table>

<sup>1</sup> The standardised V.35 interface (V.35 and V.28 electrical characteristics) is no longer offered. The electrical characteristics of this interface are identical to those of the V.36 interface.
2. **2048 KBIT/S G.703 INTERFACE FOR ACCESSING TRANSFIX SERVICES**

### 2.1 DEFINITION OF THE SERVICE

France Telecom provides, between two customer sites, a service for simultaneous bidirectional digital transmission at a rate of 2048 kbit/s.

This service is offered on a 4-wire symmetrical pair interface, which complies with chapter 6 of ITU-T Recommendation G.703.

### 2.2 SYNCHRONISATION AND JITTER

If the clock frequencies are not aligned in the two transmission directions, they are adjusted by way of frame jumps or repeated frames.

The local DTE provides timing of 2048 kHz \( \pm 50 \times 10^{-6} \) to the remote DTE to ensure that the link operates correctly.

The maximum authorised jitter outgoing from the DTE must comply with Recommendation G.823.

### 2.3 CONNECTION INTERFACE

The connection interface, available on the customer distribution frame, is composed of four wires with symmetrical pairs, with separate shields per pair.

The connection interface is represented by a terminating block supplied by France Telecom.

### 2.4 OPERATION

**Test loops:**

Test loops are available to locate any faults.

**Reaction to transmission problems:** If there is a problem with the transmission channel, the data transmitted to the DTE in the direction affected is set to 1.
3. G.703/G.704 INTERFACE FOR ACCESSING TRANSFIX AND TRANSFIX 2.0 SERVICES

3.1 DEFINITION OF THE SERVICE

France Telecom provides, between two customer sites, a service for simultaneous bidirectional digital transmission at rates of 256, 384, 512, 768, 1024, 1920 or 1984 kbit/s, on a basic frame at 2048 kbit/s whose structure complies with Recommendation G.704 (§ 2.3 and § 5, excluding § 5.1.3).

This service is offered on a 4-wire symmetrical pair interface, which complies with chapter 6 of Recommendation G.703.

The DCEs are supplied, installed and maintained by France Telecom.

Time Slot 0 (TS 0) of the G.704 frame delivered by the customer DTE must comply with section 2.3.2 of Recommendation G.704, but it is not transmitted in the network.

The CRC-4 procedure is not enabled on the G.703/G.704 interface.

One of the options in the table below must be chosen by the customer for presentation of data TS's in the frame sent by the DTE.

"Data" denotes the contents of the TS's assigned to the leased link concerned only (excluding TS 0).

<table>
<thead>
<tr>
<th>Rate</th>
<th>Option 1 - with TS 16</th>
<th>Option 2 - without TS 16</th>
</tr>
</thead>
<tbody>
<tr>
<td>256 kbit/s</td>
<td>TS 1 - 3 + TS 16</td>
<td>TS 1 - 4</td>
</tr>
<tr>
<td>384 kbit/s</td>
<td>TS 1 - 5 + TS 16</td>
<td>TS 1 - 6</td>
</tr>
<tr>
<td>512 kbit/s</td>
<td>TS 1 - 7 + TS 16</td>
<td>TS 1 - 8</td>
</tr>
<tr>
<td>768 kbit/s</td>
<td>TS 1 - 11 + TS 16</td>
<td>TS 1 - 12</td>
</tr>
<tr>
<td>1024 kbit/s</td>
<td>TS 1 - 16</td>
<td>N/A</td>
</tr>
<tr>
<td>1920 kbit/s</td>
<td>TS 1 - 30</td>
<td>N/A</td>
</tr>
<tr>
<td>1984 kbit/s</td>
<td>TS 1 - 31</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Note:** With option 1, TS 16 is handled and carried in the network in the same way as any other data TS.
3.2 SYNCHRONISATION

If the clock frequencies are not aligned in the two transmission directions, they are adjusted by way of frame jumps or repeated frames.

Transfix:

By default, the clock frequencies are produced and delivered by the DCE using its internal oscillator, which has a precision level greater than 50.10^{-6}.

With special configurations, the link can be synchronised by the DTE.

Transfix 2.0:

France Telecom synchronises the link, via the G.703/G.704 interface.

3.3 CONNECTOR

Properties of the connector available on the DCE:

- Connection: Female 9-pin Sub-D with lock
- Functions: Transmission signal and reception signal
- Electrical characteristics: Comply with Recommendation G.703

![Connector Diagram]

Note: Pins 4 and 7 are connected to pin 1 (inside the equipment)

3.4 OPERATION

Test loops:

![Test Loops Diagram]

Standardised test loops are available to locate any faults.
It is possible to enable loop 3 for the G.703/G.704 interface. This loop, controlled manually, provokes:
- the loopback of data carried in the link to the local DTE,
- all data transmitted in the remote DTE direction to be set to 1.

It is also possible to enable loop 2 for the G.703/G.704 interface. This loop, controlled manually, provokes:
- the loopback of data to the remote equipment,
- all data transmitted in the local DTE direction to be set to 1.

**DCE reaction to transmission problems:**
If there is a problem with the transmission channel, the data transmitted to the DTE in the direction affected is set to 1.

### 4. MULTICHANNEL G.703/G.704 INTERFACE FOR ACCESSING TRANSFIX 2.0 SERVICES

#### 4.1 DEFINITION OF THE SERVICE

France Telecom provides, between a customer's central site and various customer remote sites, Transfix 2.0 leased links with a rate of 64, 128, 256, 384, 512, 768 or 1024 kbit/s (unit rates).

The links are presented on the DCE of the central site on a multichannel interface which groups all the links on the same G.703/G.704 interface.

The CRC-4 procedure is not enabled on the G.703/G.704 interface.

At the **central site** end, access to the service is via a G.703/G.704 interface; the composite rate on the multichannel interface cannot exceed 1920 kbit/s.

At the **remote site** end, access to the service is via the interfaces defined in the following chapters of this document: X.24/V.11, V.35, V.36, G.703/G.704 or multichannel G.703/G.704 interface.

Data TS's (1 - 15 and 17 - 31) in the tributary frame are assigned by France Telecom, who provides the customer with this information when the leased link is commissioned.
Signalling transport management:
Signalling transport in TS 16 is not permitted. Circuits 109 or 1 of the remote site interfaces are forced closed. TS 0 of the G.704 delivered by the customer DTE must comply with section 2.3.2 of Recommendation G.704, but it is not transmitted in the network.

4.2 SYNCHRONISATION
If the clock frequencies are not aligned in the two transmission directions, they are adjusted by way of frame jumps or repeated frames.
France Telecom synchronises the link, via the G.703/G.704 interface.

4.3 CONNECTION INTERFACE
Properties of the connection interface available on the DCE:
- Connector: Female 9-pin Sub-D with lock
- Functions: Transmission signal and reception signal
- Electrical characteristics: Comply with Recommendation G.703

![Connection interface diagram]

Note: Pins 4 and 7 are connected to pin 1 (inside the equipment)

4.4 OPERATION
Test loops:
The customer is not offered any test loops at the multichannel G.703/G.704 interface end.
France Telecom can enable, remotely:
- loop 2 on the access interface, remote site end,
- the loopback of the n data TS's of one or more links on the access interface, central site end.
DCE reaction to transmission problems:
If there is a problem with the transmission channel, the data transmitted to the DTE in the direction affected and on each link concerned is set to 1.

5. X.24/V.11 INTERFACE FOR ACCESSING TRANSFIX AND TRANSFIX 2.0 SERVICES

5.1 DEFINITION OF THE SERVICE
France Telecom provides, between two customer sites, a service for simultaneous bidirectional digital transmission at rates of 64, 128, 256, 384, 512, 768, 1024 and 1920 kbit/s.

5.2 SYNCHRONISATION
Transfix:
The clock frequencies delivered to the S and B circuits are produced by the DCE using its internal oscillator.

Transfix 2.0:
The clock frequencies delivered to the S and B circuits are produced using the reference timing supplied by the France Telecom network.

5.3 CONNECTION INTERFACE
The functional characteristics of the circuits comply with Recommendation X.24.

Transport on the I circuit of the state of the C circuit, provided by the DTE located at one end of the link, is optional. Reproduction of any phase relationship between the T and C circuits of the DCE at one end of the link and the R and I circuits of the remote DCE is not supported.
Connector
The interface is available on a 15-pin female connector (illustrated below) that complies with the ISO 4903 standard. The connector is attached to the DCE, to a connection strip, or to the end of an adapter unit.

ISO 4903 connector – Contact side

5.4 OPERATION

Test loops:
Standardised test loops are available to locate any faults.

Standardised loops 2 and 3 can be enabled (Recommendation X.150). These loops are enabled by the customer using a control device (e.g. switch or key).

It is possible to remotely control loop 2 on the DCE located at the other end of a link by way of manual intervention on the local DCE.

DCE reaction to transmission problems:
If there is a problem with the transmission channel (reception direction), circuit R is set to 1 and circuit I is opened.

Note: This action is taken immediately for data, but only on expiry of a 1 s timer after detection of the problem for the I circuit.
6. V.36 INTERFACE FOR ACCESSING TRANSFIX AND TRANSFIX 2.0 SERVICES

6.1 DEFINITION OF THE SERVICE
France Telecom provides, between two customer sites, a service for simultaneous bidirectional digital transmission at a rate of 64 kbit/s.

The service is established on point-to-point links. Access to the service is via an ISO 4902 connector (also called a V.36 connector).

![Diagram of V.36 interface](image)

6.2 SYNCHRONISATION
Transfix:
The clock frequencies delivered to circuits 114 and 115 are produced by the DCE using its internal oscillator.

Transfix 2.0:
The clock frequencies delivered to circuits 114 and 115 are produced by the DCE using the reference timing supplied by the France Telecom network.

6.3 CONNECTION INTERFACE
The functional characteristics of the circuits comply with Recommendation V.24.
The electrical characteristics of circuits 103, 104, 114 and 115 comply with Recommendation V.11.
The electrical characteristics of circuits 105 and 109 comply with Recommendation V.10 or V.11. The receiver complies with Recommendation V.10 category 1 or V.11, without termination.
The electrical characteristics of circuits 106, 107, 140, 141 and 142 comply with Recommendation V.10. The receiver complies with Recommendation V.10 category 2.

Transport to the remote end on circuit 109 of the state of circuit 105, provided by the DTE located at one end of the link, is optional.
6.4 OPERATION

Test loops:
Standardised test loops are available to locate any faults.

DCE reaction to transmission problems:
If there is a problem with the transmission channel, the data bits on circuit 104 are set to 1 and circuits 109 and 107 are opened.

Note: This action is taken immediately for data, but only on expiry of a 1 s timer after detection of the problem for circuit 109.
7. **V.35 INTERFACE FOR ACCESSING TRANSFIX AND TRANSFIX 2.0 SERVICES**

7.1 **DEFINITION OF THE SERVICE**

France Telecom provides, between two customer sites, a service for simultaneous bidirectional point-to-point digital transmission at a rate of 64 kbit/s.

![Diagram of V.35 interface](image)

7.2 **CONNECTION INTERFACE**

As the V.35 standardised interface (V.35 and V.28 electrical characteristics) is no longer offered, the service is established on links and access to the service is via an ISO 2593 connector (also called a V.35 connector). The electrical characteristics of the circuits of this interface are identical to those of the V.36 interface (see chapter 6).

**Connector**

The interface is available on a 34-pin female connector (illustrated below) that complies with the ISO 2593 standard. The pin diameter is 1 mm.

The connector is attached to the DCE, to a connection strip, or to the end of an adapter unit.
8. 64 KBIT/S G.703 INTERFACE FOR ACCESSING TRANSFIX 2.0 SERVICES

8.1 DEFINITION OF THE SERVICE
France Telecom provides, between two customer sites, a service for simultaneous bidirectional point-to-point digital transmission at a rate of 64 kbit/s, unrestricted with octet integrity.

The service is established on point-to-point links and access to the service is via a codirectional physical interface that complies with chapter 1 of Recommendation G.703.

8.2 SYNCHRONISATION
The clock frequencies are produced by the DCE using its internal oscillator, which has a precision level greater than 100.10^-6.

8.3 CONNECTOR
Properties of the connector available on the DCE:
Connection: Termination strip or connecting strip
Functions: Transmission signal and reception signal
Electrical characteristics: Comply with Recommendation G.703

8.4 OPERATION
Test loops:

Standardised test loops are available to locate any faults.
It is possible to enable local loop 2. This loop is enabled by the customer using the control device on the front of the DCE.

Note:
When it is enabled, loop 2 provokes:
- the loopback of data to the remote DTE,
- all data transmitted in the local DTE direction to be set to 1.

DCE reaction to transmission problems:
If there is a problem with the transmission channel, the data transmitted to the DTE in the direction affected is set to 1.
9. **V.24/V.28 INTERFACE FOR ACCESSING TRANSFIX SERVICES**

### 9.1 DEFINITION OF THE SERVICE

The Transfix low bit rate service is a service for simultaneous bidirectional synchronous digital transmission at rates of 2400, 4800, 9600 and 19200 bit/s. With the Transfix option for (simplex) asynchronous transmission without error correction described in section 9.3, the modulation rates are 1200, 2400, 4800, 9600 and 19200 bauds.

Access to the service is via a V.24/V.28 physical interface available on the DCE.

The connecting cable between the DTE and the service termination point is supplied by the customer.

### 9.2 SYNCHRONISATION

The clock frequencies delivered to circuits 114 and 115 are produced using the reference timing supplied by the France Telecom network.

### 9.3 ASYNCHRONOUS TRANSMISSION SERVICE

Flow control is not available with this version of the service. Simplex operation is not offered.

**Default configuration:**

The tolerance for the rate of modulation of the signals transmitted by the DTE is +2.3 to –2.5%. The characters processed by the DCE contain:

- 1 start element,
- 7 information elements,
- 1 stop element.

### 9.4 CONNECTION INTERFACE

The functional characteristics of the physical interface comply with Recommendation V.24. The circuits used for the service are circuits 102, 103, 104, 105, 106, 107, 108, 109, 113, 114, 115, 140, 141 and 142.

The electrical characteristics given in this section comply with Recommendation V.28.
**Connector**

The connector available on the DCE is a 25-pin female connector that complies with the ISO 2110 standard.

Note: Some of the equipment used by France Telecom, on pin 9 of the V.24 connector (marked national reserve in the ISO 2110 standard) has a direct voltage of +5 V.

**9.5 OPERATION**

Test loops:
Standardised test loops are available to locate any faults.

Standardised loops 2 and 3 can be enabled (Recommendation V.54). The user can control these loops using a control device.

**DCE reaction to transmission problems:**
If there is a problem with the transmission channel, the data transmitted to the DTE in the direction affected is set to 1.

**10. HISTORY**

<table>
<thead>
<tr>
<th>Edition</th>
<th>Date</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>March 2000</td>
<td>First version</td>
</tr>
<tr>
<td>2</td>
<td>October 2000</td>
<td>Title changed and minor modifications made</td>
</tr>
</tbody>
</table>