

**SPECIFICATION of the GENERIC
TRANSMISSION INTERFACE**

Interconnection Specification 1

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1. General

This Specification sets out the transmission requirements and objectives to be met by KCH and the Operator for the interconnection of the KCH and Operator Systems. The requirements are based on the relevant European Telecommunications Standards Institute (ETSI), International Telecommunications Union (ITU) and Networks Interoperability Consultative Committee (NICC) Recommendations.

References to Global Systems Mobile / Personal Communications Networks (GSM/PCN) are based upon ETSI/ GSM recommendation. 3.5 phase 1. This recommendation is currently under review and will be updated to ETSI 300 540 GSM Phase 2.

End to end requirements involve the performance of Customer equipment which is outside KCH and the Operators controls.

Customer networks as referred to throughout this document typically consist of at least one item of Customer Premises Equipment (CPE) situated beyond the Network Terminating Point (NTP).

Where this Specification sets out matters that the parties endeavour to agree, and agreement is not reached, such matters shall be disputes.

2. Responsibilities

The responsibility for overall transmission quality is held by the party selected by the Customer to carry the Call. If the Call is an indirect access Call then the indirect access Operator is responsible for the end to end quality of the Call.

If the overall transmission quality for a Call cannot be met because either party is unable to comply with the reasonable requests of the other party, then neither party will be obliged to convey the Call.

3. Relevant Parameters

Overall performance is affected by the following parameters:

- Overall loss
- Transmission Time (Absolute delay and propagation delay)
- Echo and Stability
- Quantising distortion
- Coding standards
- Attenuation distortion
- Group delay distortion
- Sidetone loss
- Crosstalk
- Errors
- Jitter and Wander

KCH and the Operator shall endeavour to achieve the requirements and objectives for overall loss, delay, echo loss, quantising distortion, and coding standards given in sections 4 to 10 inclusive. KCH and the Operator shall each plan in accordance with the guidance given for the remaining parameters listed above.

It should be noted that for some parameters the CPE may have a significant effect on the end to end performance.

4. Overall transmission loss

4.1 Loudness Rating (LR)

The limits for overall loss expressed in terms of Loudness Ratings (LR) are defined in ITU-T Recommendation P. 76 (Blue book November 1989).

5. Apportionment of Overall Loudness Rating (OLR)

5.1 End to End Requirements

KCH and the Operator shall endeavour to:

- a) provide connections which fall within the specifications in section 6 of "The Recommended Standard for the National Transmission Plan for Public Networks" produced by the Public Network Operators Interest Group (PNO-IG) of the Networks Interoperability Consultative Committee (NICC);
- b) avoid connections which exceed the ITU-T Recommended limiting OLR value of 29dB; and
- c) minimise the range of different Transmission levels experienced by any one Customer.

5.2 GSM/PCN Loudness Control

Cellular network operators may utilise digital level control in the mobile switched network to control Send Loudness Rating (SLR) and Receive Loudness Rating (RLR) values.

5.3 RLR And Receive GSM Volume Control

The use of any Customer controlled receive volume control shall not decrease (i.e. make more sensitive) the RLR, by more than 10 dB for planning purposes.

6. Transmission Time

6.1 Transmission Delays Within The Fixed Network - Without echo control

For UK Calls not employing echo control, the NTP - NTP one way delay shall be as specified in section 7.2 of "The Recommended Standard for the National Transmission Plan for Public Networks". This includes calls to an International Gateway.

6.2 Preferred Apportionment Of Transmission delay

The apportionment principles presented in Figure 1 ensure that KCH or Operator Customers experience acceptable levels of transmission delay. Any reapportionment of the segment boundaries (Collection, Transport and Delivery) shall be subject to joint agreement.

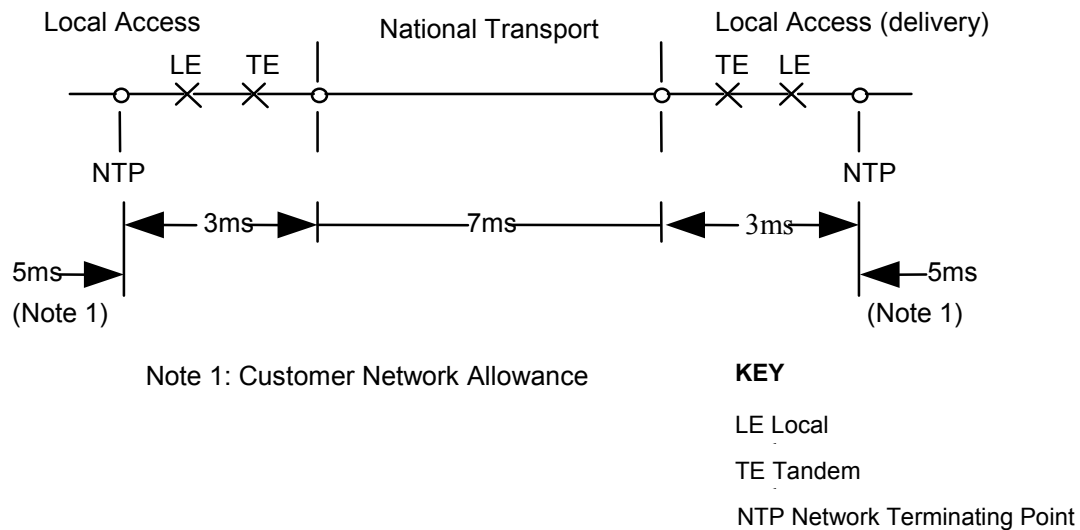


FIGURE 1 Transmission Delays Through the UK Telephone Network

6.3 Maximum delay under route failure conditions

In situations where calls have to be re-routed around failed sections of the network the maximum delay permitted is as specified in section 7.2 of "The Recommended Standard for the National Transmission Plan for Public Networks".

6.4 Transmission Delays Within The Fixed Network - With echo control

Where echo control is provided over the fixed network, the one-way delay limit shall be as specified in section 7.3 of "The Recommended Standard for the National Transmission Plan for Public Networks". This includes calls to an International Gateway.

International Calls using echo control should not exceed 400 ms, it is however recognised that under cable circuit failure/congestion conditions, satellite backup circuits may not meet this requirement.

6.5 Transmission Delays Involving Digital Mobile/Wireless Access

6.5.1 Transmission Delays Between Digital Mobile/wireless access and the Fixed Network - With echo control

The one way delay limit shall be as specified in section 7.3 of "The Recommended Standard for the National Transmission Plan for Public Networks".

6.5.2 Transmission Delays Within Digital Mobile/wireless access Networks - With echo control.

The one way delay limit shall be as specified in section 7.3 of "The Recommended Standard for the National Transmission Plan for Public Networks".

7. Echo Loss

KCH and the Operator shall seek to meet the design objective for echo loss (as defined in ITU-T Recommendation G122) presented at the Switch Connection with equal relative levels for both directions of transmission of 20dB, with no connections being less than 15dB for practical implementation.

CPE connected via a 2-wire interface can have significant effect on echo losses. For planning purposes KCH and the Operator shall assume that CPE will present an impedance of 600 ohms or the network shown in fig 5 of BS6305 at the 2 wire NTP.

CPE and Customer networks are likely to determine the largest part of echo losses in the case of 4-wire connection to the KCH and the Operator Systems. For planning purposes KCH and the Operator shall assume that the CPE meets the 20dB echo loss objectives given in the OfTel Network Code of Practice (for the Design of Private Telecommunications Networks) - NCOP.

7.1 GSM/PCN Echo Loss

The echo loss under operational conditions for a GSM/PCN based system shall be at least 46 dB referred to the Switch Connection with any Customer volume control set to its maximum output (i.e. loudest) position. ETSI/GSM 03.50/1 Section 3.4.1 provides further information related to echo loss. ITU-T Recommendation G.165 provides guidance for the performance of echo control devices when switched into a connection. ITU-T Recommendations G151 and G.473 refer.

7.2 Echo Control - International Conformance

Echo control devices for international connections to and from KCH shall conform to section 7.4 of "The Recommended Standard for the National Transmission Plan for Public Networks".

7.3 Echo Control - GSM

The GSM/PCN system shall provide echo protection as stated in ETSI/GSM 03.50/1 Section 3.4.2.

8 Stability Loss

For International Calls and National Calls stability loss considerations shall be satisfied by the following requirement.

The loss presented at the Switch Connection shall be as specified in section 6.6 of "The Recommended Standard for the National Transmission Plan for Public Networks".

CPE connected via a 2-wire interface may have a significant effect on stability loss. For planning purposes KCH and the Operator shall assume the CPE may present either open circuit or short circuit conditions at a 2-wire NTP.

CPE and Customer networks are likely to largely determine the stability losses in the case of 4-wire connection to the KCH and the Operator Systems. For planning purposes KCH and the Operator shall assume that the CPE meets the 6dB stability

loss requirement given in the OfTel Network Code of Practice (for the Design of Private Telecommunications Networks) - NCOP.

It is recognised by the parties that stability losses of less than 6 dB could cause oscillation.

9 Quantising Distortion

9.1 Fixed Network Limits

In order to meet international and UK requirements the quantising distortion shall meet the specification in section 10.2.1 of "The Recommended Standard for the National Transmission Plan for Public Networks".

9.2 Mobile Network limits

The quantising distortion when connected to a mobile network shall meet the specification in section 10.2.2 of "The Recommended Standard for the National Transmission Plan for Public Networks".

For planning purposes KCH and the Operator shall assume that Customer networks do not introduce more than 2 qdu.

10. Coding Standards

At a digital interface it is a requirement that analogue information shall be encoded using the 8bit, A-law characteristic in accordance with section 10.2.1 of "The Recommended Standard for the National Transmission Plan for Public Networks".

11. Noise

In general noise limits shall be as specified in section 10.3 "The Recommended Standard for the National Transmission Plan for Public Networks". However for more clarity the following shall apply:

The limits for single tone or narrow band noise shall be more stringent than the limits for wideband noise to avoid Customer annoyance. As a general rule, the power in any individual tone should be 10dB less than the psophometric noise power in the circuit (ITU-T Recommendation P.11).

The following ITU-T recommendations shall be complied with to give appropriate limits;

Digital Exchanges - Recommendations Q.551 and Q.554;
PCM line systems - Recommendation G.712;
GSM/PCN systems - ETSI/GSM 3.50/1 section 3.2.

The limits in Recommendation G.123 are of particular importance as they control the level of noise on International Calls.

12. Attenuation Distortion

In order to adequately control attenuation distortion each component of the connection shall have a suitable distortion limit. The following ITU-T Recommendations apply:

Digital Exchanges - Recommendations Q.551 and Q.554;
Digital Line Systems - Recommendation G.712

13. Group Delay Distortion

The following ITU-T Recommendations give suitable limits for the group delay distortion introduced by line transmission systems and coding processes in digital exchanges:

Digital Exchanges - Recommendations Q.551 and Q.554
Digital Line Systems - Recommendation G.712

13.1 Sidetone Masking Rating - Normal Telephony Customer to KCH PSTN.

The Sidetone Masking Rating (STMR) for telephony CPE connected to a KCH Network Terminating Point shall nominally be taken as 7 dB for planning purposes.

13.2 Sidetone Masking Rating KCH PSTN to GSM/PCN

The Sidetone Masking Rating (STMR) for telephony CPE allowing users to gain access through the GSM system shall be nominally taken as outlined in ETSI/GSM 03.50/1 for STMR and LSTR.

14. Error Performance

Error performance of digital networks is of key importance as it determines the end to end performance of both end to end digital services and analogue services supported by the KCH and Operator Systems.

The allocation principles of Recommendation G.821 shall be used when determining the error for individual transmission systems.

15. Non Speech Levels

The use of any non-speech signals within an established Call, or during the phase of Call set-up or clear down, for such purposes as signalling (e.g. DTMF) shall comply with the principles set in Section 4 of BS6305: 1992, that have been based upon a 0 dBr interface.

Interfaces that are not taken as a 0 dBr point shall be planned as if they were a 0 dBr for purposes of realising interconnection between the KCH System and a PCN/ GSM System.

16. GSM/PCN Handset Sensitivity/Frequency Characteristics

The GSM/PCN system shall provide a performance in accordance with Section 3.8 of ETSI/GSM Recommendation 03.50/1.

17. References

ITU-T recommendations

- G.123 Circuit Noise In National Circuits
- G.165 Echo cancellers
- G.712 Performance characteristics of PCM channels between 4-wire interfaces at voice frequencies.
- P.11 Effect Of Transmission Impairments
- P.76 Determination of Loudness rating; Fundamental principles
- Q.551 Transmission characteristics of digital exchanges.
- Q.554 Transmission characteristics at digital interfaces of a digital Exchange.

OfTel Requirements

NCOP - OFTEL Network Code Of Practice for the design of Private Telecommunications Networks

ETSI Specifications

ETSI/GSM Recommendation 03.50

NICC Recommendations

The Recommended Standard for the National Transmission Plan for Public Networks (NPDS7(94)4) Issue 3. June 1999.

18. History

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END OF SPECIFICATION

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