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**STANDARDISATION GUIDE
FOR INTERCONNECTION OF EXTERNAL
TELECOMMUNICATIONS SERVICES (ETS)
PLATFORMS WITH THE PUBLIC
TELECOMMUNICATIONS NETWORKS
(PTNs) USING SIGNALLING SYSTEM NO. 7**



**TELECOMMUNICATIONS AUTHORITY
HONG KONG**

FOREWORD

1. This Standardisation Guide sets out the responsibilities and technical procedures for interconnection of external telecommunications services (ETS) platforms with the public telecommunications networks (PTNs) in Hong Kong using Signalling System No. 7 (C7).
2. PTNs in Hong Kong, including networks of Fixed Telecommunication Network Services (FTNS) and Public Mobile Radiotelephone Services / Personal Communications Services, are interconnected with one another based on C7. The technical requirements for C7 are specified in HKTA 2202. HKTA 2202 is a network-to-network connection specification mandated by the Telecommunications Authority (TA) and operators of the PTNs shall follow HKTA 3204 for implementation of the network-to-network connection specification.
3. For interconnection of other public telecommunications services with the PTNs, C7 may also be used subject to the approval of the TA. Operators licensed to provide ETS may be permitted to use C7 for interconnection of their platforms with the FTNS networks. It is a licensing condition that the ETS operators shall adopt non-propriety technical standards or standards prescribed by the TA for interconnection between the services and other telecommunications networks and services.
4. C7 Equipment of ETS platforms in Hong Kong should comply with HKTA 2202. At present, C7 equipment falls outside the scope of the Hong Kong Telecommunications Equipment Evaluation and Certification (HKTEC) Scheme and is not subject to evaluation and certification procedures as required by the TA. Evaluation of the equipment to ensure its compliance with HKTA 2202 should be done by interworking test or compatibility check based on bilateral coordination between the ETS operators and their directly connected FTNS operators.
5. This Guide supplements the network-to-network connection specification HKTA 2202 and is intended to facilitate coordination between the FTNS operators and the ETS operators so as to enable prompt and efficient network interconnection, to maintain integrity and stability of C7, to ensure proper interworking of basic telecommunications services and to support development of new telecommunications services. This Guide shall be followed by the FTNS operators and ETS operators.
6. In case of doubt about the interpretation of this Guide, the decision of the TA shall be final.

7. The HKTA series specifications as well as other information notes issued by the TA can be obtained through one of the following methods:-

- download direct through the OFTA's Internet Home Page. The Home Page address is <http://www.ofta.gov.hk>;
- hard copies will be available upon request to :-
Senior Telecommunications Engineer (Standards)
Office of the Telecommunications Authority
29/F, Wu Chung House,
213 Queen's Road East,
Wanchai,
Hong Kong.

8. If further information is required regarding this Standardisation Guide, please contact :

Senior Telecommunications Engineer (Standards)
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1. INTRODUCTION

- 1.1 This Standardisation Guide sets out the responsibilities and technical procedures for interconnection of external telecommunications service (ETS) platforms with the public telecommunications networks (PTNs) in Hong Kong using Signalling System No. 7 (C7). This Guide shall be followed by Fixed Telecommunication Network Services (FTNS) operators and ETS operators using C7 for interconnection.

2. GENERAL RESPONSIBILITIES

- 2.1 For interconnection of their platforms with FTNS networks using C7, the ETS operators shall use equipment conforming to Section II of the network-to-network connection specification HKTA 2202 (hereafter referred to as "the specification") and any subsequent amendments to the specification, with the exception of those items not applicable to the ETS as approved by the TA.
- 2.2 Amendment or re-issue of the specification may not be distributed automatically to the ETS operators and it will be the responsibility of the ETS operators to ensure that their equipment conform to the latest requirements.
- 2.3 The ETS operators shall also observe the HKTA 31xx series Regulatory Guides applicable to operation of ETS platforms.
- 2.4 The ETS operators seeking interconnection with FTNS networks shall be treated technically as customers of the FTNS operators. For implementation of any technical options not specified in the specification, the C7 equipment employed by the ETS operators shall be compatible with the FTNS networks with which they interconnect directly (hereafter referred to as the "direct FTNS networks").
- 2.5 The ETS operators shall ensure proper operation of their C7 equipment and prevent harm to the overall integrity and stability of C7 networks in Hong Kong. The ETS operators shall take corrective actions in a prompt and efficient manner in case that the performance of the PTNs is adversely affected due to the interconnection of their platforms using C7.
- 2.6 The operators of the direct FTNS networks shall take all reasonable actions to prevent harm to other C7 networks and C7 equipment caused by the ETS C7 equipment. The operators shall take corrective actions in a prompt and efficient manner in case that the performance of the PTNs is adversely affected due to ETS C7 equipment connected to the direct FTNS networks.
- 2.7 The ETS operators and the operators of the direct FTNS networks shall follow the technical procedure as described in Section 3 of this Guide to establish and maintain C7 interconnection between them.
- 2.8 The ETS operators failing to follow the specification and this Guide may result in disconnection of their C7 equipment from the direct FTNS networks.

3. TECHNICAL PROCEDURE FOR C7 INTERCONNECTION

- 3.1 The ETS operators shall prepare conformance statements indicating the conformity of their C7 equipment with the specification. Such statements should be made based on the information supplied by the manufacturers of the equipment. The statements should be made available for inspection upon request by the operators of their direct FTNS networks or the TA.
- 3.2 The ETS operators shall be required to carry out a technical evaluation for their C7 equipment as requested by the operators of the direct FTNS networks before bringing into their services.
- 3.3 The technical evaluation shall cover a set of items as given in Appendix I to this Guide, which will be commonly carried out by the FTNS operators if applicable to the C7 configuration of the concerned ETS operators. Additional items may also be specified by the operators of the direct FTNS networks. The operators shall ensure that the additional items are reasonable and essential.
- 3.4 In case that their C7 equipment are modified after the establishment of the interconnection, the ETS operators shall ensure that the modified equipment continue to conform to the specification. The ETS operators shall also inform the operators of the direct FTNS networks of any significant modifications¹ to their C7 equipment. Upon the request of the operators, the ETS operators shall be required to carry out part or all of the procedures specified in clauses 3.1 to 3.3.
- 3.5 The operators of the direct FTNS networks shall prepare reports on the technical evaluation in clause 3.3 for the C7 equipment of ETS operators. The reports shall contain the minimum information as described in Appendix II to this Guide. The reports shall be available upon request by the concerned ETS operators or the TA for reference.

¹ Examples of "significant modifications" are addition of switches, change of switches and hardware or software changes / updates of the equipment which affect the C7 interconnection.

4. REFERENCE

- [1] HKTA 2202 "Network Connection Specification for Network-to-Network Connection of the Public Telecommunications Networks (PTNs) in Hong Kong Based on ITU-T Common Channel Signalling System No. 7" issued by the TA.
- [2] HKTA 3101 "Regulatory Guide for Calling Line Identity (CLI) Format" issued by the TA.
- [3] HKTA 3102 "Regulatory Guide for the Technical Configurations of External Telecommunication Service Platforms operated by External Telecommunication Service Operators" issued by the TA.
- [4] HKTA 3204 "Standardisation Guide for Implementation of Mandatory Network-to-Network Connection Specifications" issued by the TA.

- END -

APPENDIX I

**COMMON SET OF EVALUATION ITEMS FOR INTERCONNECTION
BETWEEN FTNS NETWORKS AND C7 EQUIPMENT OF ETS PLATFORMS**

COMMON SET OF EVALUATION ITEMS FOR INTERCONNECTION BETWEEN FTNS NETWORKS AND C7 EQUIPMENT OF ETS PLATFORMS

Item	Reference	Title (Note 1)	Class of Items (Note 2)	Evaluation Method (Note 3)
Level 1 Physical Layer Evaluation Items				
T1/E1 Digital Trunk Interface Test				
1.	G703	Bit Rate (kb/s)	*	Measurement Test / Document Evaluation
2.	G703	Line Code	*	Measurement Test / Document Evaluation
3.	G703	Impedance	*	Measurement Test / Document Evaluation
4.	G703	Pulse Shape	*	Measurement Test / Document Evaluation
5.	G824/G823	Output jitter	*	Measurement Test / Document Evaluation
6.	G703	Bit Error Rate	*	Measurement Test / Document Evaluation
7.	G704	Frame Structure	*	Measurement Test / Document Evaluation
8.	G704	Remote Alarm Indication	*	Measurement Test / Document Evaluation
9.	G704	Remote Multi-frame Alarm Indication	*	Measurement Test / Document Evaluation
Performance Characteristics of PCM Channels				
10.	G712	Stability	*	Document Evaluation
11.	G712	Echo Loss	*	Document Evaluation
12.	G712	Idle Channel Noise	*	Document Evaluation
13.	G712	Group Delay	*	Document Evaluation
14.	G712	Attenuation / Frequency Distortion	*	Document Evaluation
15.	G712	Longitudinal Balance	*	Document Evaluation
16.	G712	Total Distortion, including Quantizing	*	Document Evaluation
17.	G712	Variation of Gain with Input Level	*	Document Evaluation
Supervisory Tone Characteristics (generated from ETS system)				
18.	HKTA 2201	Ringling Tone		Measurement Test / Document Evaluation
19.	HKTA 2201	Busy Tone		Measurement Test / Document Evaluation
20.	HKTA 2201	Number Unobtainable Tone		Measurement Test / Document Evaluation
21.	HKTA 2201	Tone Harmonic		Measurement Test / Document Evaluation
Others				
22.		ETS System Detection of Remote Alarm Indication (RAI)	*	Functional Check
23.		ETS System Synchronisation Test	*	Functional Check
C7 MTP Level 2 (Q.781) Test Items				
24.	Q781/1.1	Link State Control Expected signal units/orders , Initialisation (Power-up)	*	See ITU-T Recommendation
25.	Q781/1.2	Link State Control Expected signal units/orders, Timer T2	*	See ITU-T Recommendation
26.	Q781/1.5	Link State Control Expected signal units/orders , Normal alignment correct procedure (FISU)	*	See ITU-T Recommendation

Item	Reference	Title (Note 1)	Class of Items (Note 2)	Evaluation Method (Note 3)
27.	Q781/1.19	Link State Control Expected signal units/orders, Set emergency while in "not aligned state"		See ITU-T Recommendation
28.	Q781/1.21	Link State Control Expected signal units/orders, Both ends set emergency		See ITU-T Recommendation
29.	Q781/1.25	Link State Control Expected signal units/orders, Deactivation during initial alignment	*	See ITU-T Recommendation
30.	Q781/1.29	Link State Control Expected signal units/orders, Deactivation during link in service	*	See ITU-T Recommendation
31.	Q781/1.32	Link State Control Expected signal units/orders, Deactivation during the proving period	*	See ITU-T Recommendation
32.	Q781/3.5	Transmission failure , Link in service (Break Tx path)	*	See ITU-T Recommendation
33.	Q781/9.1	Transmission and reception control (PCR), MSU transmission and reception		See ITU-T Recommendation
C7 MTP Level 3 (Q.782) Test Items				
34.	Q782/1.1	Signalling link management, First signalling link activation	*	See ITU-T Recommendation
35.	Q782/1.2	Signalling link management, Signalling linkset deactivation	*	See ITU-T Recommendation
36.	Q782/1.3	Signalling link management, Signalling linkset activation	*	See ITU-T Recommendation
37.	Q782/2.4.1	Signalling message handling, Load sharing within a linkset - All links available	*	See ITU-T Recommendation
38.	Q782/2.4.2	Signalling message handling, Load sharing within a linkset - With one link unavailable		See ITU-T Recommendation
39.	Q782/3.1	Changeover, Changeover initiated at one side of a linkset (COO < COA)	*	See ITU-T Recommendation
40.	Q782/3.7	Changeover, Emergency changeover at one side of a linkset (COO < ECA)		See ITU-T Recommendation
41.	Q782/4.1	Changeback, Changeback within a linkset	*	See ITU-T Recommendation
42.	Q782/7.1.1	Management inhibiting, Inhibition of a link - Available link	*	See ITU-T Recommendation
43.	Q782/7.1.2	Management inhibiting, Inhibition of a link - Unavailable link	*	See ITU-T Recommendation
44.	Q782/7.2.1	Management inhibiting, Inhibition not permitted – Local reject on available link		See ITU-T Recommendation
45.	Q782/7.2.2	Management inhibiting, Inhibition not permitted – Local reject on unavailable link		See ITU-T Recommendation
46.	Q782/7.6.1	Management inhibiting, Manual uninhibition of a link – With changeback		See ITU-T Recommendation
47.	Q782/7.6.2	Management inhibiting, Manual uninhibition of a link – Without changeback		See ITU-T Recommendation
48.	Q782/7.8	Management inhibiting, Not possible uninhibition		See ITU-T Recommendation
49.	Q782/12.1	Signalling link test, After activation of a link (SLTM)	*	See ITU-T Recommendation
ISUP Basic Call (Q.784) Test Items				
Circuit supervision				
51.	Q784/1.1	Circuit supervision, Non-allocated circuits	*	See ITU-T Recommendation
52.	Q784/1.2.1	Reset of circuits, RSC received on an idle circuit	*	See ITU-T Recommendation
53.	Q784/1.2.2	Reset of circuits, RSC sent on an idle circuit	*	See ITU-T Recommendation
54.	Q784/1.2.3	Reset of circuits, RSC received on a locally blocked circuit	*	See ITU-T Recommendation
55.	Q784/1.2.4	Reset of circuits, RSC received on a remotely blocked circuit	*	See ITU-T Recommendation
56.	Q784/1.2.5	Reset of circuits, Circuit group reset received	*	See ITU-T Recommendation
57.	Q784/1.2.6	Reset of circuits, Circuit group reset sent	*	See ITU-T Recommendation
58.	Q784/1.2.7	Reset of circuits, Circuit group reset received on remotely blocked circuits	*	See ITU-T Recommendation
59.	Q784/1.3.1.1	Circuit group blocking/unblocking, CGB and CGU received	*	See ITU-T Recommendation
60.	Q784/1.3.1.2	Circuit group blocking/unblocking, CGB and CGU sent	*	See ITU-T Recommendation

Item	Reference	Title (Note 1)	Class of Items (Note 2)	Evaluation Method (Note 3)
61.	Q784/1.3.2.1	Circuit blocking/unblocking, BLO received	*	See ITU-T Recommendation
62.	Q784/1.3.2.2	Circuit blocking/unblocking, BLO sent	*	See ITU-T Recommendation
63.	Q784/1.3.2.3	Circuit blocking/unblocking, Blocking from both ends; removal of blocking from one end	*	See ITU-T Recommendation
64.	Q784/1.3.2.4	Circuit blocking/unblocking, IAM received on a remotely blocked circuit		See ITU-T Recommendation
Normal call setup - Ordinary speech calls				
65.	Q784/2.2.1a	Called address sending (<16 digits), en bloc operation	*	See ITU-T Recommendation
66.	Q784/2.2.1b	Called address sending (>=16 digits, IAM+SAM), en bloc operation	*	See ITU-T Recommendation
67.	Q784/2.2.2	Called address sending, Overlap operation (with SAM)		See ITU-T Recommendation
68.	Q784/2.3.1	Successful Call setup, Ordinary call (with various indications in ACM)		See ITU-T Recommendation
69.	Q784/2.3.2a	Successful Call setup, Ordinary call (with ACM, CPG and ANM) - CPG before ACM		See ITU-T Recommendation
70.	Q784/2.3.2b	Successful Call setup, Ordinary call (with ACM, CPG and ANM) - - CPG after ACM		See ITU-T Recommendation
71.	Q784/2.3.3	Successful Call setup, Ordinary call (with various indications in CON)		See ITU-T Recommendation
72.	Q784/2.3.6	Successful Call setup, Blocking and unblocking during a call (initiated)	*	See ITU-T Recommendation
73.	Q784/2.3.7	Successful Call setup, Blocking and unblocking during a call (received)	*	See ITU-T Recommendation
Normal call release				
74.	Q784/3.1a	Normal call release, Calling party clears before any backward messages - REL is received from calling leg (cause value = 16)	*	See ITU-T Recommendation
75.	Q784/3.1b	Normal call release, Calling party clears before any backward messages - REL is received from calling leg (cause value = 31)	*	See ITU-T Recommendation
76.	Q784/3.2	Normal call release, Calling party clears before answer	*	See ITU-T Recommendation
77.	Q784/3.3a	Normal call release, Calling party clears after answer - REL is received from calling leg (cause value = 16)	*	See ITU-T Recommendation
78.	Q784/3.3b	Normal call release, Calling party clears after answer - ISUP REL is received from calling leg (cause value = 31)	*	See ITU-T Recommendation
79.	Q784/3.4	Normal call release, Called party clears after answer	*	See ITU-T Recommendation
80.	Q784/3.5	Normal call release, Suspend initiated by the network (triggered by called party release)	*	See ITU-T Recommendation
81.	Q784/3.6	Normal call release, Suspend and resume initiated by a calling party		See ITU-T Recommendation
82.	Q784/3.7	Normal call release, Suspend and resume initiated by a called party		See ITU-T Recommendation
Unsuccessful call setup				
83.	Q784/4.1a	Unsuccessful call setup, Validate a set of known causes for release (user busy, cause = 17)	*	See ITU-T Recommendation
84.	Q784/4.1b	Unsuccessful call setup, Validate a set of known causes for release (no answer from user, cause = 19)	*	See ITU-T Recommendation
85.	Q784/4.1c	Unsuccessful call setup, Validate a set of known causes for release (unallocated number, cause = 1)	*	See ITU-T Recommendation
86.	Q784/4.1d	Unsuccessful call setup, Validate a set of known causes for release (no route to destination, cause = 3)		See ITU-T Recommendation

Item	Reference	Title (Note 1)	Class of Items (Note 2)	Evaluation Method (Note 3)
87.	Q784/4.1e	Unsuccessful call setup, Validate a set of known causes for release (address incomplete, cause = 28)		See ITU-T Recommendation
88.	Q784/4.1f	Unsuccessful call setup, Validate a set of known causes for release (normal-unspecified, cause = 31)		See ITU-T Recommendation
89.	Q784/4.1g	Unsuccessful call setup, Validate a set of known causes for release (switching equipment congestion, cause = 42)		See ITU-T Recommendation
90.	Q784/4.1h	Unsuccessful call setup, Validate a set of known causes for release (temporary out of service, cause = 41)		See ITU-T Recommendation
Abnormal situation during a call				
91.	Q784/5.2.2	Timers, T9: waiting for an answer message		See ITU-T Recommendation
92.	Q784/5.2.4	Timers, T6: waiting for RES (Network) message		See ITU-T Recommendation
93.	Q784/5.3.1	Reset of circuits during a call, Of an outgoing circuit		See ITU-T Recommendation
94.	Q784/5.3.2	Reset of circuits during a call, Of an incoming circuit		See ITU-T Recommendation
Special call setup				
95.	Q784/6.2.1	Automatic repeat attempt, Dual seizure for non-controlling SP		See ITU-T Recommendation
96.	Q784/6.3.1	Dual seizure, Dual seizure for controlling SP		See ITU-T Recommendation
Miscellaneous Items				
97.		Remote exchange restart (force release)		Functional Check
98.		Self exchange restart (force release)		Functional Check
99.		T2: waiting for RES (User) message after receipt of Suspend		Functional Check
100.	HKTA 3101	Confirmation of sending of CLI (original calling party) by FTNS network to ETS system for external outgoing call (FTNS -> ETS)	*	Functional Check
101.	HKTA 3101	Checking of Format of CLI sent by ETS system (ETS code + xxxx) for inbound call from ETS (ETS -> FTNS)	*	Functional Check
102.	HKTA 2202	Setting of Number Incomplete (NI) indicator by ETS system for inbound call from ETS (ETS -> FTNS)	*	Functional Check
103.	HKTA 2202	Setting of International Indicator by ETS system for external incoming call (ETS -> FTNS)	*	Functional Check

Note :

1. The listed items will be evaluated by the operators of the direct FTNS networks if the items are applicable to the ETS C7 equipment during the evaluation. For example, items 39-48 may not be evaluated if the ETS C7 equipment have only one C7 signalling link. Items which are not applicable to the initial configuration of the ETS C7 equipment may need to be re-evaluated when they become applicable to a subsequently modified configuration.
2. Under Class of Items, items marked with * are "Essential" and unmarked items are "Optional" with the following meaning:
 - (a) "Essential" items are items which must be carried out between the ETS C7 equipment and the direct FTNS networks
 - (b) "Optional" items are items which may be carried out at the discretion of the operators of the direct FTNS networks
3. Details of the test configuration, procedure and acceptance criteria for the listed items will be specified by individual FTNS operators. The following should be noted :
 - (a) For items 1-9 and 18-21, the evaluation method will be based on measurement by suitable testing equipment, but in some cases documentary proof of compliance may be accepted by individual FTNS operator
 - (b) For items 10-17, documentary proof of compliance will be accepted by the FTNS operators
 - (c) For items 24 to 96, the evaluation method will be based on the ITU-T Blue Book Recommendations quoted in the Reference column.
 - (d) For items 22-23 and 97-103, the evaluation method will be functional check with procedure specified by the FTNS operators

Appendix II - Evaluation Reports for C7 Equipment of ETS Platforms

The following are the minimum information which should be contained in the evaluation report prepared by the operator of the direct FTNS network for the C7 equipment of an ETS platform:

1. Date of Evaluation
2. Person-in-charge of the Evaluation
3. Switch model and software version of ETS platform
4. Overall results of the evaluation according to the following categories:
 - (a) ACCEPT for C7 interconnection with PTNs
 - (b) REJECT for C7 interconnection with PTNs
5. Results of evaluation for individual items recorded according to the following categories:
 - (a) Pass
 - (b) Fail and accept (with reasons given) – Note 1
 - (c) Fail and reject (with reasons given) – Notes 1 and 2
 - (d) Not applicable to ETS C7 equipment (with suitable remarks given)

Note 1

In general, the acceptance criteria for individual items will be decided by the operator of the direct FTNS network. To determine the result of an item as "fail and accept" or "fail and reject", the operator should assess the impact on

- the interworking of basic telecommunications services
- the reliability and integrity of C7 signalling in its network and other networks
- the maintenance of proper network operation and management

Note 2

An evaluation item with the result of "fail and reject" should be regarded as a critical failure of the concerned evaluation. Such item should be taken as basis for rejecting C7 interconnection in determining the overall evaluation results.