

Recommendation T/CS 42-05 (Nice 1985)**SYSTEM R2 SIGNALLING TESTS VIA THE EUROPEAN COMMUNICATIONS SATELLITE (ECS)**

Recommendation proposed by Working Group T/WG 11 "Switching and Signalling" (CS)

Text of the Recommendation adopted by the "Telecommunications" Commission:

"The European Conference of Post and Telecommunications Administrations,

considering

- that the System R2 is at present the preferred signalling system for telephone links via the ECS system,
- that Administrations may use either analogue or digital terrestrial links to access the ECS system,
- that new equipment designs which can affect signalling are to be used with the ECS system,
- that it is desirable to ensure correct interworking of different implementations of similar equipment,

recommends

to members of the CEPT intending to employ System R2 signalling via the ECS system, the signalling test procedures specified below."

PREAMBLE

This Recommendation has no equivalent CCITT Recommendation.

This Recommendation advocates that prior to the introduction of ECS using SS R2, a series of compatibility tests should be performed between Administrations/RPOA's.

The major phases of testing recommend are:

- (a) Testing of the operation of the SS R2 equipment at the ISC.
- (b) Early compatibility test between Administrations/RPOA's.
- (c) Performance testing of the digital access link to the earth station from the ISC.
- (d) Testing of the operation of the ECS line signalling channel.
- (e) Testing of the operation of SS R2 via a looped circuit at the earth station.
- (f) Testing of the operation of SS R2 via a circuit looped via the ECS.
- (g) A programme of tests with partner countries via the ECS.

A list of proposed SS R2 tests is included.

1. INTRODUCTION

New equipment designs, such as TDMA/DSI earth stations, digital line systems, transmultiplexers and digital ISC equipment, all of which can affect signalling, may be used on connections via the European Communications Satellite (ECS).

To ensure smooth integration of signalling equipment and correct interworking with other Administrations using similar equipment developed by different manufacturers, it is proposed that a series of signalling tests be carried out before entering service via ECS. The proposals given below provide details of such tests which may be utilised by Administrations as appropriate.

It is recognised that, because of different equipment implementations, some of the proposed test arrangements may not be met by, or, may not fully meet individual Administrations' requirements. In such cases, Administrations should make their own arrangements bearing in mind the testing principles proposed.

Proposals are made for the early proving of compatibility of signalling equipment by utilising analogue circuits between the ISCs concerned, before the overall digital transmission path between participating ISCs may be available. It is recommended that Administrations undertake these early tests as appropriate, in order to minimise problems of incompatibility that could otherwise arise later.

The testing of inter-register signalling via the satellite should embrace the use of all possible inter-register signals. It would be useful, for further study of the problem, if facilities could be made available to provide information relating to the duration times of short transmission breaks causing receipt of split digits.

Signals and procedures referred to in this recommendation are described and detailed in the following documents, to which reference should be made as appropriate:

- Recommendation T/CS 42-02. *System R2 line signalling*, analogue version;
- Recommendation T/CS 42-03. *System R2 line signalling*, digital versions;
- Recommendation T/CS 42-04. *System R2 line signalling conversion*;
- Recommendation T/CS 42-09. *Signalling and circuit supervision via ECS*;
- CCITT Recommendations Q.440-Q.480. *System R2 inter-register signalling and procedures*;
- Eutelsat document ECS/C11-17 Rev. 1. *TDMA/DSI system specifications*.

2. SIGNALLING TEST REQUIREMENTS

Figure 1 shows the various arrangements of access links and signalling equipment that may be employed for ECS. Proposed staged signalling tests for each of the 3 arrangements are given below.

2.1. Arrangement A

- (a) Check the operation of System R2 digital equipment at the ISC. These tests should form part of the normal acceptance tests for new equipment and will be agreed between Administrations and equipment contractors. Back to back tests between outgoing and incoming equipment at the ISC should be included.
The use of System R2 digital line signalling terminations at analogue ISCs will be covered by these tests.
- (b) Early proving tests may be conducted as described in Section 3. It is essential that interworking between different manufacturers equipment is undertaken.
- (c) Check the performance of the digital link between the ISC and earth station. This would normally be regarded as being part of the acceptance testing necessary for new transmission links.
- (d) As part of the overall acceptance test program for the earth station it is envisaged that interworking between Time Slot 16 and the Line Signalling Channel (LSC) will be checked to ensure that correct translation occurs in accordance with Table 3 of Recommendation T/CS 42-09.
- (e) If possible, confirm correct working of ISC signalling by loop-back at the earth station. The signalling tests detailed in Appendix 1 should be used for this purpose. The loop-back to enable back to back tests between outgoing and incoming equipment at the ISC may be made via Terrestrial Interface Module (TIM) or via TDMA equipment, or both, as appropriate.
- (f) If back to back testing via the satellite loop-back is possible, then the signalling tests detailed in Appendix 1 should be used, including the use of inter-register pulsed signals.
- (g) A program of signalling tests with partner countries, via ECS, should be performed between ISCs as described in Appendix 1. If compatibility with a different manufacturer's equipment has not been proven (as in (b) above) then this should be performed, preferably with at least 2 other different equipments.

The opportunity should be taken to check that the fault conditions and consequent actions described in Table 1 of Recommendation T/CS 42-09 result in the correct setting of LSC and Time Slot 16 bit patterns.

2.2. **Arrangements B and C**

- (a) Check that the System R2 signalling conversion equipment conforms to the specifications of Recommendation T/CS 42-04. These tests would normally form part of the equipment acceptance tests agreed between the Administration and the manufacturer.
- (b) Early proving tests may be conducted as described in Section 3. However, the degree of proving and the capability of testing abnormal signalling conditions depend upon the method of implementation of the signalling converter. If possible, it is essential that interworking with signalling equipment made by a different manufacturer is undertaken.
- (c) As in Section 2.1.(c) for Arrangement B.
- (d) As in Section 2.1.(d).
- (e) As far as possible the signalling tests described in Appendix 1 should be checked with loop-backs as described in Section 2.1.(e).
- (f) As far as possible back to back testing via the satellite should be performed as described in Section 2.1.(f).
- (g) The signalling tests described in Section 2.1.(g) should be performed as far as possible.

In the case of Arrangement C, the fault conditions and consequent actions described in Table 2 of Recommendation T/CS 42-09 apply in lieu of those described in Table 1.

Appendix 1

1. GENERAL

The proposals for System R2 tests have been made with the major emphasis being placed on proving compatibility of the digital version of line signalling and on those areas of inter-register signalling that may be affected by the ECS system. This is because the specifications of the digital version of line signalling have undergone major revision and because, basically, the inter-register signalling of System R2 has been well proven.

2. NORMAL OPERATION (O/G END)

- 2.1. Check that test calls can be set up correctly including the use of pulsed backward signals and that they are released correctly under the following conditions:
 - 2.1.1. during inter-register signalling;
 - 2.1.2. in the unanswered (ringing) state;
 - 2.1.3. in the answered state;
 - 2.1.4. in the clear back state.
- 2.2. Check that receipt of $a_b = 1$, $b_b = 1$ in the idle state causes blocking of the outgoing circuit.
- 2.3. Check that receipt of a clearback-reanswer sequence is followed correctly.

3. DETECTION OF ABNORMAL LINE SIGNALLING CONDITIONS

Check that receipt of the abnormal line signalling conditions given below results in the appropriate actions specified in Recommendation T/CS 42-03.

3.1. At the outgoing end

- 3.1.1. Premature answer, $a_b = 0$, $b_b = 1$, prior to completion of inter-register signalling.
- 3.1.2. Non-receipt of seizure acknowledgement signal, $a_b = 1$, $b_b = 1$.
- 3.1.3. Receipt of $a_b = 0$, $b_b = 0$ in the idle state.
- 3.1.4. Receipt of $a_b = 0$, $b_b = 1$ in the idle state.
- 3.1.5. Receipt of $a_b = 0$, $b_b = 0$ in the seized state.
- 3.1.6. Receipt of $a_b = 0$, $b_b = 1$ in the seized state.
- 3.1.7. Receipt of $a_b = 0$, $b_b = 0$ in the seizure acknowledged state.
- 3.1.8. Receipt of $a_b = 1$, $b_b = 0$ in the seizure acknowledged state.
- 3.1.9. Receipt of $a_b = 0$, $b_b = 0$ in the answered state.
- 3.1.10. Receipt of $a_b = 1$, $b_b = 0$ in the answered state.
- 3.1.11. Receipt of $a_b = 0$, $b_b = 0$ in the clear back state.
- 3.1.12. Receipt of $a_b = 1$, $b_b = 0$ in the clear back state.
- 3.1.13. Receipt of $a_b = 0$, $b_b = 0$ in the clear forward state.
- 3.1.14. Receipt of $a_b = 0$, $b_b = 0$ in the blocked state.
- 3.1.15. Receipt of $a_b = 0$, $b_b = 1$ in the blocked state.

3.2. At the incoming end

- 3.2.1. Receipt of $a_f = 0$, $b_f = 1$ in the idle state.
- 3.2.2. Receipt of $a_f = 1$, $b_f = 1$ in the idle state.
- 3.2.3. Receipt of $a_f = 0$, $b_f = 1$ in the seizure acknowledged state.

- 3.2.4. Receipt of $a_f = 1, b_f = 1$ in the seizure acknowledged state.
 - 3.2.5. Receipt of $a_f = 0, b_f = 1$ in the answered state.
 - 3.2.6. Receipt of $a_f = 1, b_f = 1$ in the answered state.
 - 3.2.7. Receipt of $a_f = 0, b_f = 1$ in the clear back state.
 - 3.2.8. Receipt of $a_f = 1, b_f = 1$ in the clear back state.
 - 3.2.9. Receipt of $a_f = 0, b_f = 1$ in the blocked state.
 - 3.2.10. Receipt of $a_f = 1, b_f = 1$ in the blocked state.
 - 3.2.11. Receipt of $a_f = 0, b_f = 0$ in the blocked state.
 - 3.2.12. Check that after the clear forward signal is recognised, no action is taken on receipt of forward signal transitions until $a_b = 1, b_b = 0$ is sent.
- 3.3. Tests should be made to ensure that a change from one abnormal condition to another abnormal condition is recognised correctly.

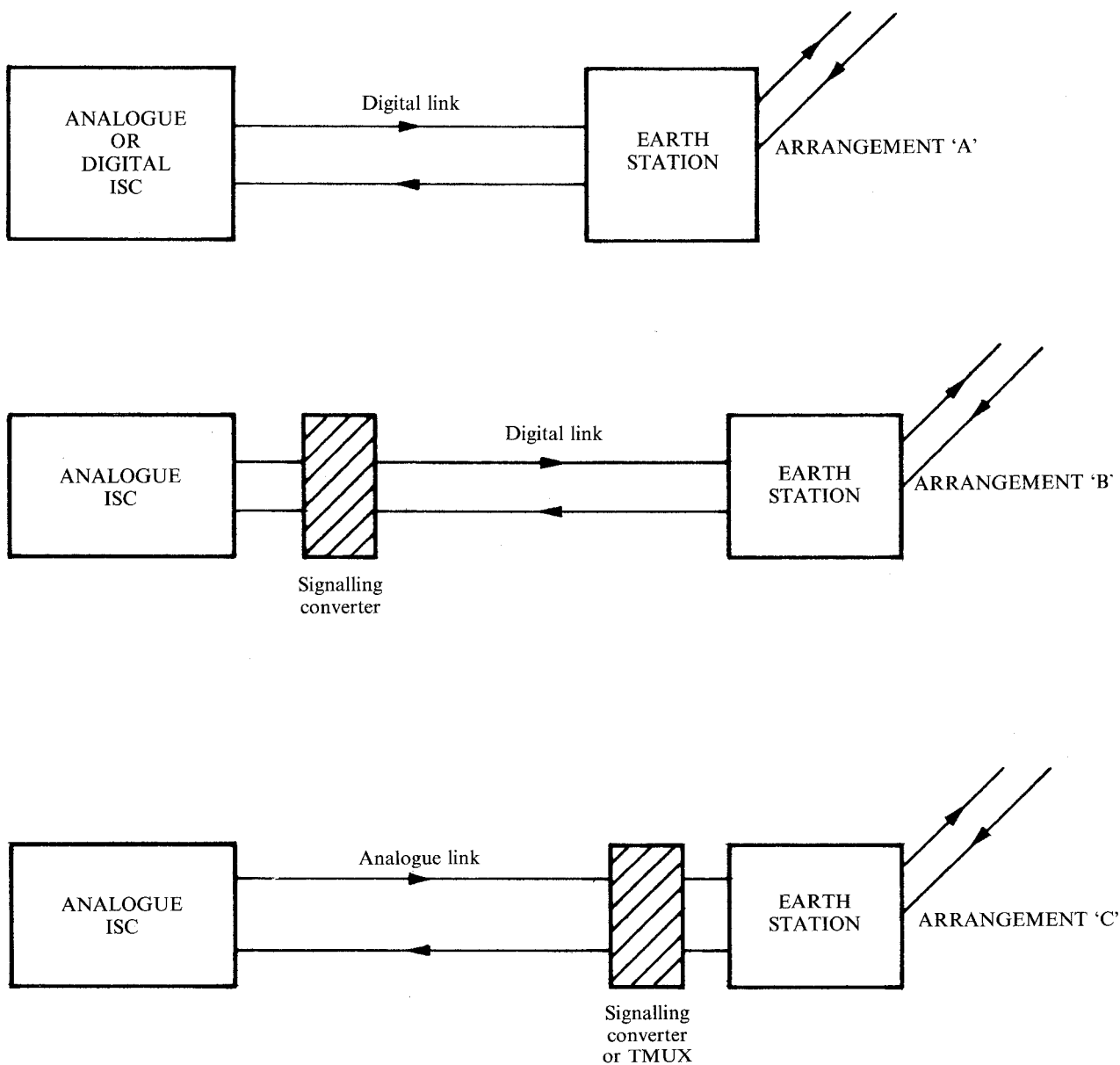


Figure 1. Arrangements of access links and System R2 signalling equipment.