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SERIES Q: SWITCHING AND SIGNALLING

International automatic and semi-automatic working –
Signalling for circuit multiplication equipment

**Signalling between signal processing network
equipment (SPNE) and international switching
centres (ISC) over an IP network**

ITU-T Recommendation Q.56

(Formerly CCITT Recommendation)

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ITU-T Recommendation Q.56

Signalling between signal processing network equipment (SPNE) and international switching centres (ISC) over an IP network

Summary

This Recommendation describes a signalling interface, procedures, and protocol required between an International Switching Centre (ISC) and Signal Processing Network Equipment (SPNE). This IP-based signalling interface provides for the call-by-call control of an SPNE in real time to ensure an appropriate signal enhancement capability such as echo control. The framework of this signalling interface allows for growth for the control of potential future SPNE types.

Source

ITU-T Recommendation Q.56 was prepared by ITU-T Study Group 11 (2001-2004) and approved under the WTSA Resolution 1 procedure on 25 May 2001.

Keywords

μ -Law, A-Law, Automatic Level Control, Echo Canceller, Frequency Equalization, IP Network, Noise Reduction, Signal Processing Equipment, SPNE.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications. The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Introduction

There is a need in networks for signal processing equipment, including echo cancellers, automatic level controllers, frequency equalizers, noise reducers, A-Law to μ -Law converters, etc. This equipment needs to be controlled on a call-by-call basis, to ensure the highest possible transmission quality.

This Recommendation describes signalling interface procedures and a protocol required between an International Switching Centre (ISC) and Signal Processing Network Equipment (SPNE). This signalling interface enables an SPNE to be controlled in real time, on a call-by-call basis, to ensure the appropriate signal enhancement capability and parameters are provided for the call. This signalling interface can be used to facilitate the efficient support of existing and future signal processing equipment at the international interface, such as echo cancellers, automatic level controllers, noise reduction devices, frequency equalizers, A-Law to μ -Law converters and other capabilities. It can be used to ensure that the appropriate capabilities are enabled or disabled on a call-by-call basis.

In this Recommendation, a TCP/IP-based protocol is described which has the ability to address 65 536 E1/T1 facilities.

The method whereby a switch determines whether a Signal Processing Function (SPF) should be enabled or disabled is not covered by this Recommendation.

ITU-T Recommendation Q.56

Signalling between signal processing network equipment (SPNE) and international switching centres (ISC) over an IP network

1 Scope

This Recommendation describes a signalling interface between an International Switching Centre (ISC) and Signal Processing Network Equipment, referred to as an SPNE. This Recommendation covers the following SPFs: echo cancellation, noise reduction, automatic level control, A-law/ μ -law conversion and frequency equalization. Remaining for further study are additional SPF functions, such as PCM offset conversions, etc. The interface is supported over an IP network.

This Recommendation is specifically concerned with the transfer of signalling information on a per-call basis between the ISC and the SPNE, and for controlling various functions contained in the SPNE.

The signalling interface defined in this Recommendation assumes a fixed relationship between the circuits of the ISC and the SPNE.

While this Recommendation is intended for use on international networks, the information defined here may be used within national networks.

This protocol can support devices that can address channels that occupy less than 8 bits in a PCM slot such as 4, 2 and 1 including 8-bit channels.

2 References

2.1 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- [1] ITU-T G.165 (1993), *Echo cancellers*.
- [2] ITU-T G.168 (2000), *Digital network echo cancellers*.
- [3] ITU-T G.169 (1999), *Automatic level control devices*.
- [4] ITU-T G.703 (1998), *Physical/electrical characteristics of hierarchical digital interfaces*.
- [5] ITU-T G.704 (1998), *Synchronous frame structures used at 1544, 6312, 2048, 8448 and 44 736 kbit/s hierarchical levels*.
- [6] ITU-T G.711 (1988), *Pulse code modulation (PCM) of voice frequencies*.
- [7] ITU-T Q.50 (2001), *Signalling between circuit multiplication equipments (CME) and international switching centres (ISC)*.
- [8] ITU-T Q.115 (1999), *Logic for the control of echo control devices*.

2.2 Bibliography

The documents listed in this clause provide informative background material for the reader and are not normative within this Recommendation.

- [9] ITU-T Q.115 (1998), *Implementor's Guide*.
- [10] IEEE 802 (1990) IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture.

3 Definitions

This Recommendation defines the following terms:

3.1 A-Law – μ -Law Converter (AMC): An A-Law – μ -Law converter is a device that converts a PCM signal sample from A-Law to μ -Law in one direction, and μ -Law to A-Law in the other.

3.2 Automatic Level Controller (ALC): An automatic level controller is defined as an SPF located in the digital transmission path that automatically adjusts the level of a signal towards a pre-determined value. Devices that modify the frequency response or spectral content of the signal are also covered by this definition. The telecommunications carrier and the ALC manufacturer will typically agree upon features to be included. See ITU-T G.169.

3.3 Signal Processing Network Equipment (SPNE): Type of equipment which contains one or more signal enhancement functions on speech channels passing through it. Examples include echo cancellers, noise reduction devices, automatic level controllers, frequency equalizers, A-law to μ -law converters and PCM offset controllers. An SPNE as referred to in this Recommendation is external to an ISC.

3.4 channel: Used herein to refer to a 64 kbit/s or sub-64 kbit/s digital circuit occupying a specific position in a frame.

3.5 E1 Facility: A transmission link operating at 2048 kbit/s, supporting 30 or 31 64 kbit/s channels.

3.6 Echo Canceller Device (ECD): An echo canceller device is an SPF that is able to remove some or all of the returned echo signal from a voice circuit. It operates by monitoring the speech signal sent to a voice circuit, and by comparing this signal with the signal received from the circuit, is able to determine what components of the returned signal are caused by an echo path in the circuit. It then is able to remove some or all of the returned echo, providing a voice circuit that is free or nearly free from the echo signal. ITU-T G.165 and G.168 describe echo canceller performance.

3.7 Frequency Equalizer (FE): A frequency equalizer is a device capable of amplifying or attenuating certain frequencies of a speech channel. It is a subset of an automatic level controller (see above).

3.8 functional entity: A grouping of service providing functions in a single location and a subset of the total set of functions required to provide the service. An entity that comprises a specific set of functions at a given location (from ITU-T Q.1290).

3.9 group: An assembly, by digital multiplexing, of digital signals occupying a specified number of timeslots to form a composite signal having a bit rate of 2048 kbit/s or 1544 kbit/s.

3.10 Incoming Echo Control Device (IECD): An incoming echo control device cancels the echo returned from the destination network with reference to the direction in which the call is set up. An IECD is normally located at the destination end of the call. However, it may be located at or near the origination end of the network if its echo processing capability is sufficient to handle the round trip delay from origination end to the destination end and back.