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Source:	Rudolf Hasler
Title:	Liaison to 3GPP
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LIAISON TO 3GPP TSG SA REGARDING THE NEW ANF TO PERFORMANCE PARAMETERS

ETSI TC STQ prepared a stage 1 description to enhance the signalling protocols for transmitting and updating performance parameters on a per call basis, see attachment. Mobile systems may also be involved in a call.

This document may have a relationship with ETSI TS 101 108 "Tandem Free Operation (TFO) ; Service Description; Stage 1".

Is any further work on this subject planned by 3GPP?

TC STQ would appreciate any comment on this subject.

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Source:	Rudolf Hasler
Title:	Transfer of performance parameters of connections on a per call basis
	End-to-end speech transmission performance
	Additional Network Feature (ANF)
	Service Description
	DES/STQ-00015
Date:	6. April 2000
Document for:	Discussion, Approval
Agenda item:	Transmission planning and related signalling

Contents

1   SCOPE

Due to the fact of increasing numbers of consecutive interconnected networks, the aim of this Standard is to help to ensure end-to-end performance of a call. In a first step the scope of this Standard is limited to end-to-end speech transmission performance, only.

This Standard specifies the Additional Network Feature (ANF) which enables the transfer of performance parameters between networks (private or public) on a per call basis in order to activate or deactivate specific network elements or to influence the routing of a particular call. This ANF is applicable to any call between any type of circuit or packet switching digital network like ISDN, PISN or digital mobile network as well as to multimedia, B-ISDN and Internet.

This Standard only covers the stage 1 description of the ANF-PERF according to ITU I.130 [6].

Any user related actions and any network control decisions based on the values of the parameters exchanged are outside the scope of this Standard. However, this Standard may form the basis for further supplementary services (SS).

2   NORMATIVE REFERENCES

[1]   ITU-T Draft Recommendation E.ISDN-PERF - Performance Parameters Definition and Measurement Methods to Assess N-ISDN Circuit Switched 64 kbit/s UDI Bearer Service

[2]   ITU-T Recommendation G.109 - Definition of categories of speech transmission quality

[3]   ITU-T Recommendation G.113 - General Characteristics of International Telephone Connections and International Telephone Circuits
Transmission Impairments

[4]   ITU-T Recommendation H.323 - Infrastructure of audio-visual services – Systems and terminal equipment for audio-visual services
Packet-based multimedia communications systems

[5]   ITU-T Recommendation H.245 - Infrastructure of audio-visual services – Communication procedures
Control protocol for multimedia communication

[6]   ITU-T Recommendation I.130 - Method for the Characterisation of Telecommunication Services supported by an ISDN and Network Capabilities of an ISDN

[7]   ITU-T Recommendation I.350 - General Aspects of Quality of Service and Network Performance in Digital Networks, including ISDNs

[8]   ITU-T Recommendation I.352 - B-ISDN ATM Cell Transfer Performance

[9]   ITU-T Recommendation I.380 - IP Packet Transfer and Availability Performance Parameters

[10]   ITU-T Recommendation I.570 - Public/Private ISDN Interworking

[11]   ITU-T Recommendation Q.115 - Logic for the control of echo control devices

[12]   ITU-T Recommendation Q.762 - General function of messages and signals of the ISDN User Part of Signalling System No. 7

[13]   ITU-T Recommendation Q.763 - Signalling System No. 7 – ISDN user part formats and codes

[14]   ITU-T Draft Recommendation Q.2965.2 – Digital Subscriber Signalling System No. 2 – Signalling of individual Quality of Service Parameters

[15]   EG 201 050: "Speech processing, Transmission and Quality Aspects (STQ); Overall Transmission Plan Aspects for Telephony in a Private Network"

[16]   Draft EG 201 474: "Speech Transmission Quality: Future approaches to speech transmission quality across multiple interconnected networks"

[17]   EN 300 171: "Private Integrated Services Network (PISN); Specification, functional models and information flows; Control aspects of circuit-mode basic services"

[18]   ETR 250: "Speech communication quality from mouth to ear for 3.1 kHz handset telephony across networks"

[19]   ETSI TS 101 108 "Digital cellular telecommunications system (Phase 2+); Tandem Free Operation (TFO); Service Description; Stage 1"

[20]   ISO/IEC 11579-1: "Information Processing – Private integrated services network Part 1 – Reference Configuration for PISN Exchanges"

[21]   DTS/TIPHON-05003: "The signalling and control of end-to-end Quality of Service in TIPHON Systems"

3 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

For the purpose of this Standard the following definitions apply:

Additional Network Feature (ANF) (see ETR 076, Dec 1996):
An Additional Network Feature (ANF) is a capability, over and above that of a basic service, provided by an ISDN, but not directly to an ISDN user.

ANF_PERF:
ANF that enables the exchange of performance parameters between networks

Intervening Network (IVN) (see ISO/IEC 11579-1 [20])
The generic term for any real type of network which is employed for the provision of inter-PINX connections

Public Network: (see ITU I.570 [10]:
A network which provides services to the general public
A more detailed definition may be found in EG 201050 [15]

Private Network: (see ITU I.570 [10]:
A network which provides services to a specific set of users only
A more detailed definition may be found in EG 201050 [15]

Supplementary Services (SS)
Supplementary services are any services provided by a network in addition to its basic service or services.

Terminal Equipment (TE) (see ETS 300 415)
An item of equipment attached to a telecommunication network to provide access for a user to one or more services..

3.2 Abbreviations

CN: Corporate Network, see ISO/IEC TR 14475

ECD: Echo Control Device

PISN: Private Integrated Services Network, see EN 300 171 [17]

PINX: Private Integrated Services network eXchange, see EN 300 171 [17]

VAD: Voice Activation Detection

4 SPECIFICATION OF THE ANF

4.1 Description of the ANF

4.1.1 General

ANF-PERF is an additional network feature which enables the exchange and the update of performance parameters of consecutive connection parts of the specific call.
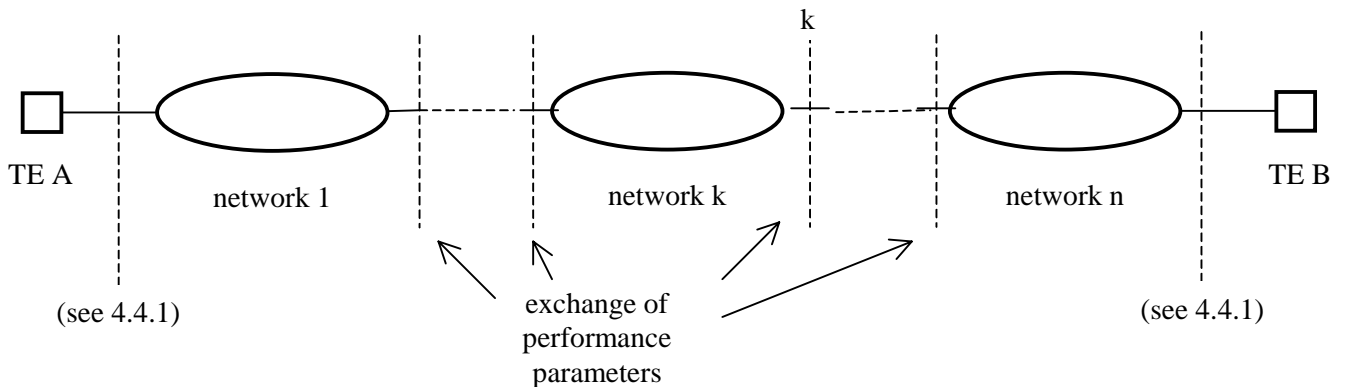

Figure 1: General Configuration

The performance parameter values are set to an initial value by the call originating network (private or public) that initiates the call (network 1 in Figure 1). It takes into account the values of TE A.

The destination network (network n in Figure 1) takes into account the values of TE B.

The values are updated upon each network boundary crossed depending on the transmission facilities used for that connection. Both directions (forward and backward) are considered simultaneously at call setup.

4.1.2 Applicability

This ANF is focussed on all connections that are used for voice communication which usually is used in a conversational (two way) mode.
Other applications may need only one way communication in which some parameters may be less relevant (e.g. delay). As networks are not aware of the detailed mode, all voice calls are treated in the same manner.

A call should be identifiable by each interconnecting network as a voice call.

The applicability to other type of calls (e.g. data or multimedia) is for further study.

4.2 Parameters

All parameters which are relevant for the user information transfer function (see ITU I.350 [7]) should be considered.

As a first step the following performance parameters are exchanged (as indicated in EG 201 474 [16])

- Accumulated one-way transmission time at the interface k in the forward direction Daccf(k)
  This parameter is used in ITU Q.762[12] as propagation delay counter.
  It is also used in ITU E.ISDN-PERF[1] as OWPD (mean One Way Propagation Delay)

- Accumulated one-way transmission time at the interface k in the backward direction Daccb(k)
  This parameter is also accumulated in the forward direction.
  Note: It is for further study if it may be assumed, that the one way transmission time in both

directions is equal.

Note: With the parameters above the network k may calculate the Tail delay in the backward direction: $Dtailb(k) = Daccf(k)+Daccb(k)$

- Total one-way transmission time in the forward direction Daccf(tot)
  This parameter will be used by the originating network for the estimation of the ear-to-ear quality.
  This parameter corresponds to the "Call history information" field of SS#7 (see Q.763 [13].
  Note: With the parameters above the network k may calculate the Tail delay in the forward direction: $Dtailf(k) = Daccf(tot)-Daccf(k)+Daccb(k)$

- Echo control device indicator (ecdi) (as defined in ITU Q.115[11])

- Incoming half echo control device request indicator (as defined in ITU Q.115 [11])

- Incoming half echo control device response indicator (as defined in ITU Q.115 [11])

- Outgoing half echo control device request indicator (as defined in ITU Q.115 [11])

- Outgoing half echo control device response indicator (as defined in ITU Q.115 [11])

- Equipment Impairment factor (as defined in ITU G.113 [3], App.I and ETSI ETR 250 [18])

- Voice activity detectors (VAD)

- Codec type (useful for tandem free operation, see ETSI TS 101 108 [19])

Possible parameters for further applications:

Charge information

QoS, categories of speech transmission quality (ITU Draft G.109 [2])

Comfort noise level

Expectation factor

4.3   Parameter Values

The values of the exchanged parameters are assumed as mean values.

The networks involved in a call are responsible for the validity of the calculation, measurement or estimation of the updated values of performance parameters.
There may be configurations where the signalling data use a different path than the user data. In this case it is assumed that the instance responsible for the selection of the path for the user data is aware of the performance of that path.

The values may be time-dependent, e.g. different in the busy hours.

If appropriate, the mean values may be added, i.e. the parameters may be assumed as statistically independent.

The value of the parameters may be different for both directions of the connection.

4.4   Procedures

4.4.1   General

The ANF is always activated and used with every call setup.

The impairments of the transmission line between two networks are taken into account by the originating network.

The updated values are stored at least for the duration of a call.
In addition they may be kept for any post processing by separate feature request. This action will be done by management e.g. for statistics or required by a regulation. It is out of the scope of this document.

The recipient network during call establishment shall accept the incoming call and handle it in a best effort way.

The attempt to provide guaranteed transmission quality levels is for further study.
In such a case, detailed negotiation procedures would be required. Calls might even have to be released when the

required quality values can not be achieved. In addition, charging information depending on the resulting level would also be very desirable.

Changes of the parameter values during the call are not considered as a first step. Enhancements to consider changes during established calls e.g. call rerouting could be investigated later.

This service may also be offered to the terminal equipment. This may be realised on a subscription basis and could be considered as a supplementary service.

4.4.2   Procedures

The procedures depend on the parameters:

- Propagation delay counter:
  Accumulation of the received value
  In addition the routing may be dependent on the received value, e.g. by choosing preferred paths with low delay if the received value is relatively high.

- VAD:
  The value of this parameter is binary. It is set if VAD is used.

- Type of codecs:
  This parameter is used to support tandem free operation (TFO).
  It shall be used in a compatible way to H.323 [4] respectively H.245 [5].

- Parameters for Echo control:
  The logic is based on ITU Q.115 [11]. Examples of the signalling procedures see ISUP99.
  In addition the tail delay shall be taken into account as described in Draft EG 201 474 [16].

4.5   Interaction with other Supplementary Services and ANFs

Only the supplementary services or ANFs with interactions are indicated, in particular where a new destination network is involved:

4.5.1   Call diversion services (SS-CFU, SS-CFB, SS-CFNR)

If a call is forwarded to another destination, the values are updated according to the new transmission path.

4.5.2   Call Transfer (SS-CT)

The values are recalculated according to the new transmission path.

4.5.3   Path Replacement (ANF-PR)

The values may need to be recalculated according to the new transmission path. Further study is required.

4.6   Interworking considerations

4.6.1   Intervening Network

A part of a connection may be an intervening network.
The intervening network may be a leased line, a satellite link, a part of an ATM network with a PVC, an IP based network as examples.
The network that is responsible for the routing of a call to an intervening network should have knowledge of the performance values for that part of a connection. This will enable the network to update the performance values and to send them to the next network that handles the signalling.

Note: The performance parameters of an IP based network are summarised in ITU-T Rec. I.380 [9]. These parameters form the basis for the overall performance through the internet, i.e. between the instances that transform the continuous voice signals in a stream of packets and vice versa (e.g. gateways)

4.6.2 Interworking with networkdomains as described by TIPHON

TIPHON divides the networks up into a transport domain and a service domain. Between these two domains a signalling mechanism was introduced which among other things may be used to exchange performance parameters. Scenarios based on this architecture are covered in DTS/TIPHON-05003 [21]. The basic configuration is shown in Figure 2.
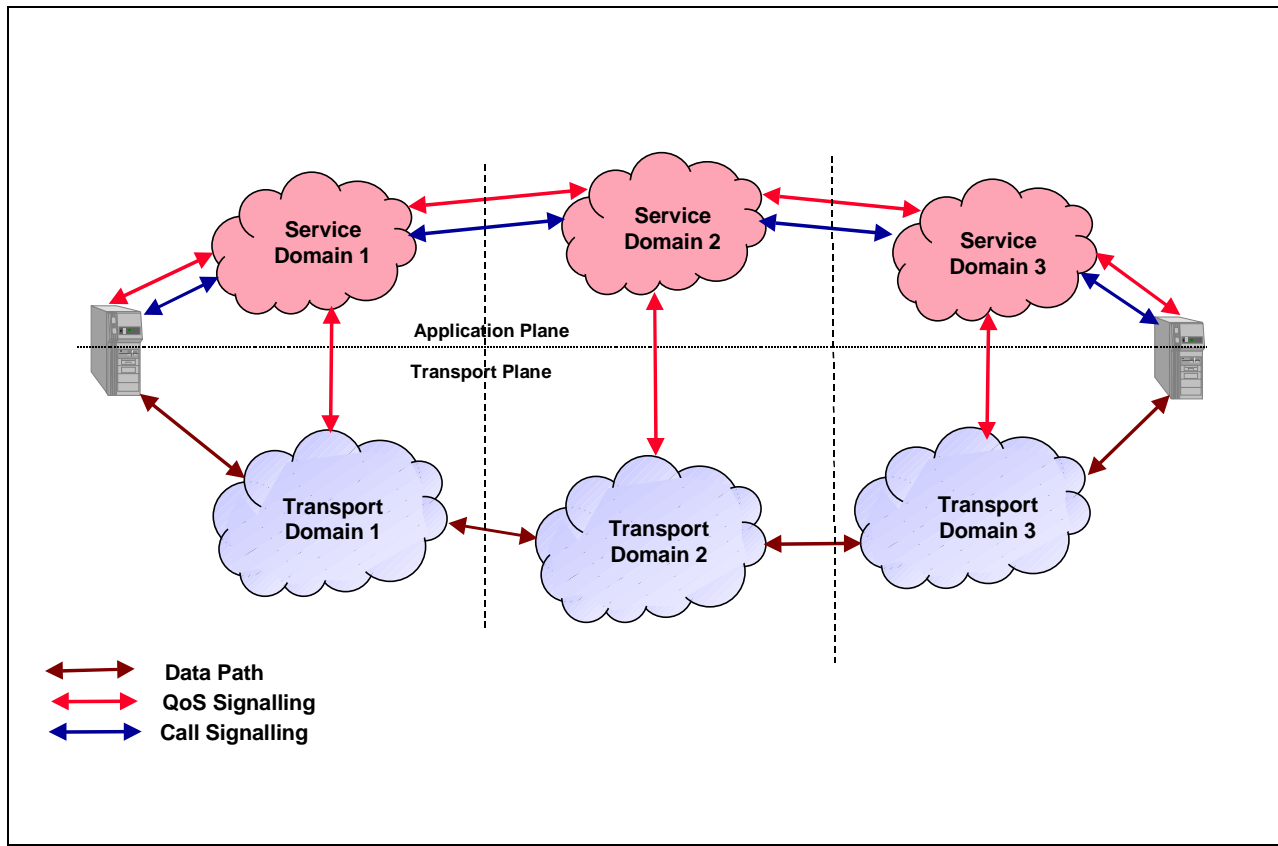
Figure 2: Generalised TIPHON Architecture II

In this case the signalling instance in the service domain takes into account the performance values received from the transport domain and updates the performance values sent to the signalling instance in the next service domain accordingly.

4.6.23 Interworking with an analogue network

An indication shall be inserted, that no end-to-end digital path for user information is available.

4.6.34 Interworking with a digital network, that does not support this ANF

An indication shall be inserted, that the ANF is not supported all the way.

4.6.45 Interworking with a mobile network

No special requirement.
The mobile network should indicate that an echo control device is included (see ITU-T Rec. Q.115 [11]), and should insert impairment factors according to the codec type used.

4.6.56 Interworking with a B-ISDN

An approach for the signalling of individual QoS parameters in a B-ISDN is done in ITU-T Rec. I.352 [8], Annex D, and Draft ITU-T Recommendation Q.2965.2 [14].

4.7   Overall SDL diagram

Figure 1 shows an overall SDL diagram of ANF-PERF. Input/output symbols represent stimuli from/to basic call control.
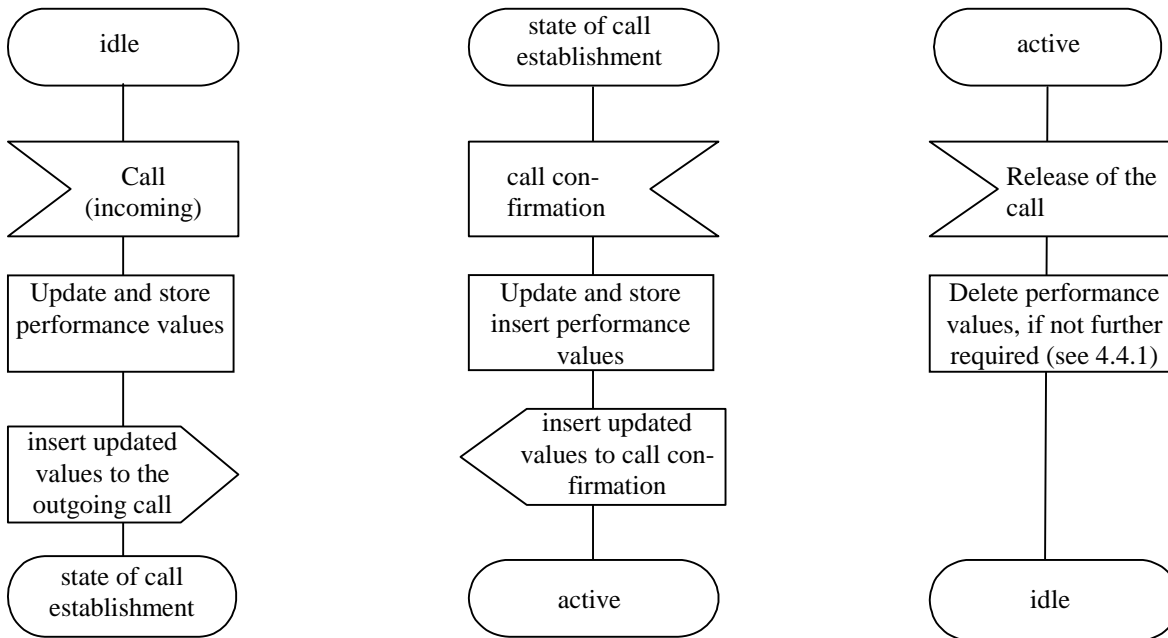
A INFORMATIVE ANNEX TO THE STAGE 1 DESCRIPTION:

Example to clarify the transfer of performance parameters. Messages to control ECDs are not yet included.

Protocols used:	analog	QSig 1	DSS1 2	SS7 3	analog

TE — PISN 1 — PISN 2 — ISDN 3 — ISDN 4 — TE

Parameters in the network elements:		Df(1) (forward) Db(1) (backward) ECD not avail. Ief=0 (forward) Ieb=0 (backw.) no VAD	Df(2) Db(2) ECD available Ief=25 (ADPCM) Ieb=25 no VAD	Df(3) Db(3) ECD available Ief=0 Ieb=0 no VAD	Df(4) Db(4) ECD available Ief=7 (ADPCM) Ieb=7 no VAD

Parameters transmitted with call setup: →	none	Daccf(1)=Df(1) Daccb(1)=Db(1) Ief=0 Ieb=0 no VAD	Daccf(2)= Daccf(1)+Df(2) Daccb(2)= Daccb(1)+Db(2) Ief=25 Ieb=25 no VAD	Daccf(3)= Daccf(2)+Df(3) Daccb(3)= Daccb(2)+Db(3) Ief=25 Ieb=25 no VAD	

Parameters transmitted with call confirm: ←	none	Daccf(tot) Ief(tot) Ieb(tot) no VAD	Daccf(tot) Ief(tot) Ieb(tot) no VAD	Daccf(tot)= Daccf(3)+Df(4) Ief(tot)=32 Ieb(tot)=32 no VAD	