The E-Model

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History

- Idea and culmination of the career of Nils-Olof Johanesson
- Developed jointly by TM5, TE4 & BTC2
- Involved several STQ experts
- Developed in period 1993-6
- Windows version implemented by Alcatel
- Defined in ETR 250 (July 96)
- Acclaimed in ITU-T

Purpose

- To predict the subjective effect of combinations of impairments using stored information on the effects of individual impairments
- To help network planners design networks
- To replace hierarchical models and apportionment (stimulated by liberalisation)

Basic principle

- "Psychological factors on the psychological scale are additive."
- R = Ro - Is - Id - Ie + A (R → MOS)
  - Ro =S/N at 0 dBr point.
  - Is = Impairments simultaneous to voice signal
  - Id = Impairments delayed after voice signal
  - Ie = Effects of special equipment eg codecs
  - A = Advantage factor (mobility)

Ro

- Noise floor
- Room noise at the send side
- Room noise at the receive side
- Circuit noise

Is - Simultaneous

- Excessive loudness
- Sidetone
- Quantising distortion (but excl low bit rate codecs)

Id - Delayed impairments

- Talker echo
- Listener echo
- Absolute delay

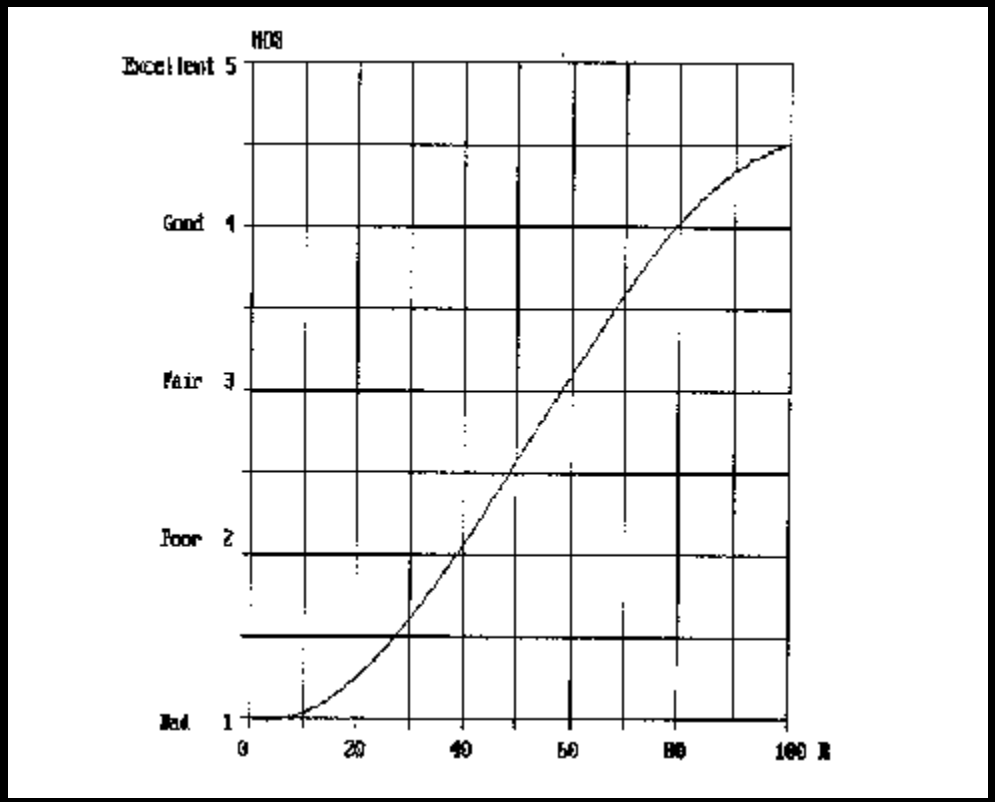
Ie - Special equipments

- Table of impairment factors (k values) for codecs at various rates
- New codecs (eg VoIP) need subjective assessment tests to determine values to use
- Assume k values are additive (area for further study)

A - Advantage / Expectation factor

- 0 for wireline
- 5 for DECT
- 10 for GSM
- 20 for locations only reached by double satellite hops

Translation form R to MOS



Computer version (ETR: 250)

- for Windows 3.1 by Peter Meschkat
- Speech Communication Quality Mouth To Ear for Windows - short 'SCQME'
- Order no: 3AV 00019 5044 Price: 98 ECU
  - Alcatel SEL AG, Business Systems Division
  - c/o Mr. Loew, Dep. PS/OLMB
  - Motorstrasse 55, D-70499 Stuttgart, Germany
  - Telephone +49 711 821 35444
  - Telefax +49 711 821 35431

Version to support network planning: EG 201 050

- for Windows 3.1 by Peter Meschkat
- Overall Transmission Plan Aspects for Telephony in a Private Network - short 'TPE'
- Order no: 3AV 00019 5050 Price: 148 ECU
  - Alcatel SEL AG, Business Systems Division
  - c/o Mr. Loew, Dep. PS/OLMB
  - Motorstrasse 55, D-70499 Stuttgart, Germany
  - Telephone +49 711 821 35444
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Configuration of digital connection

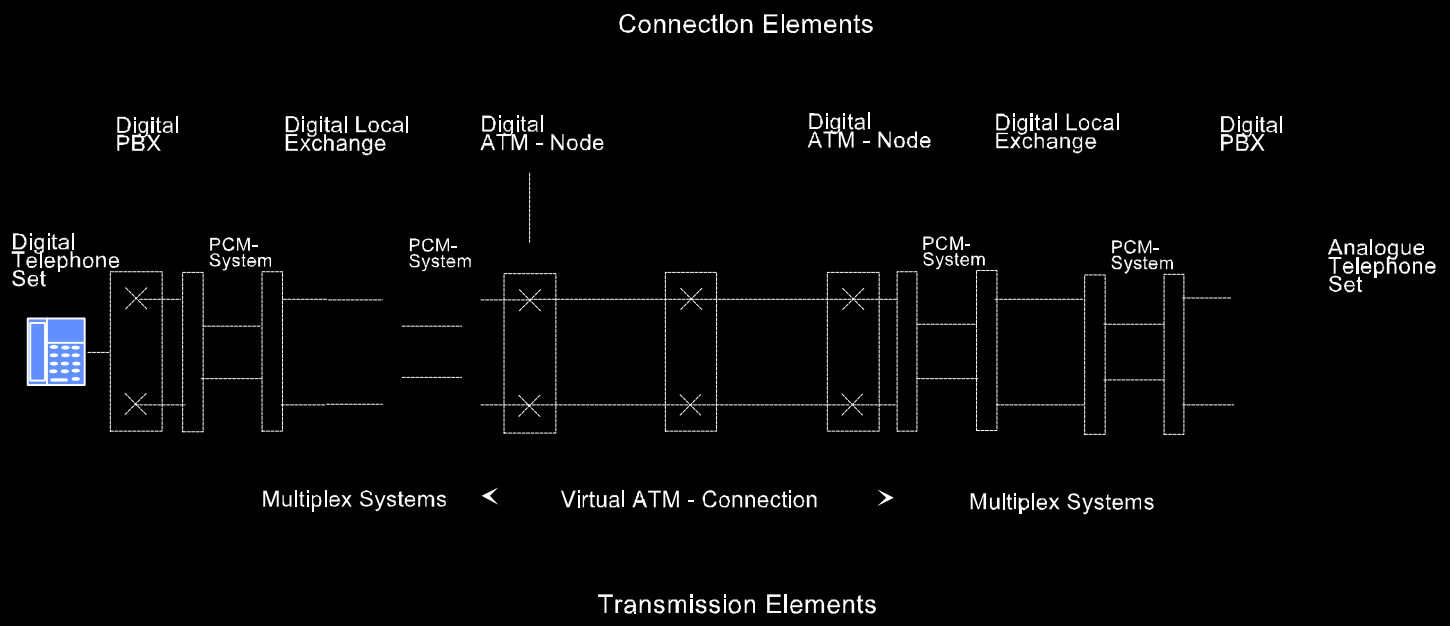
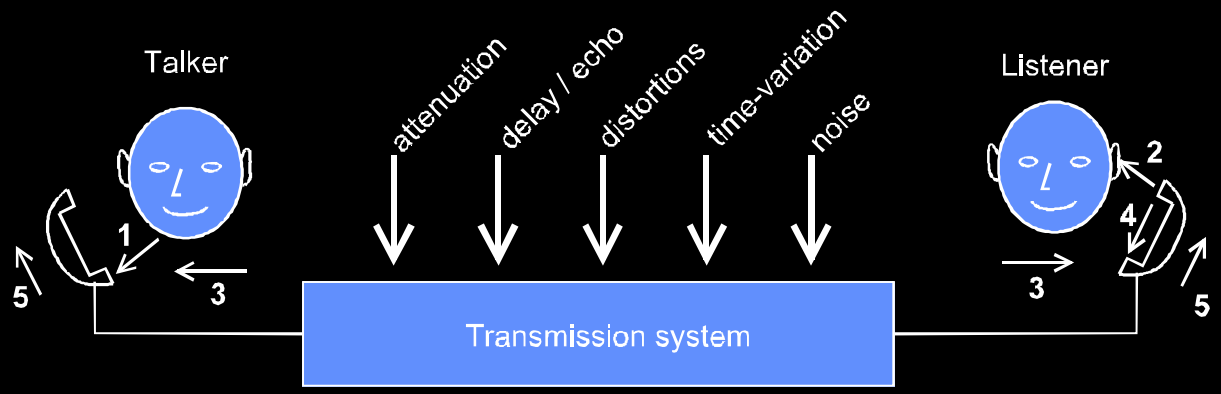


Figure 2/ETR 250:
Configuration for a fully digital connection including ATM sections with a terminating hybrid.

Parameters influencing quality



1. Sound pressure produced by the talker
2. Transmission path between earphone and eardrum
3. Ambient (room) noise
4. Loss between earphone and microphone
5. Loss between microphone and earphone

Figure 5/ETR 250
: Transmission parameters influencing the quality of a handset telephone connection.

Configuration and parameters

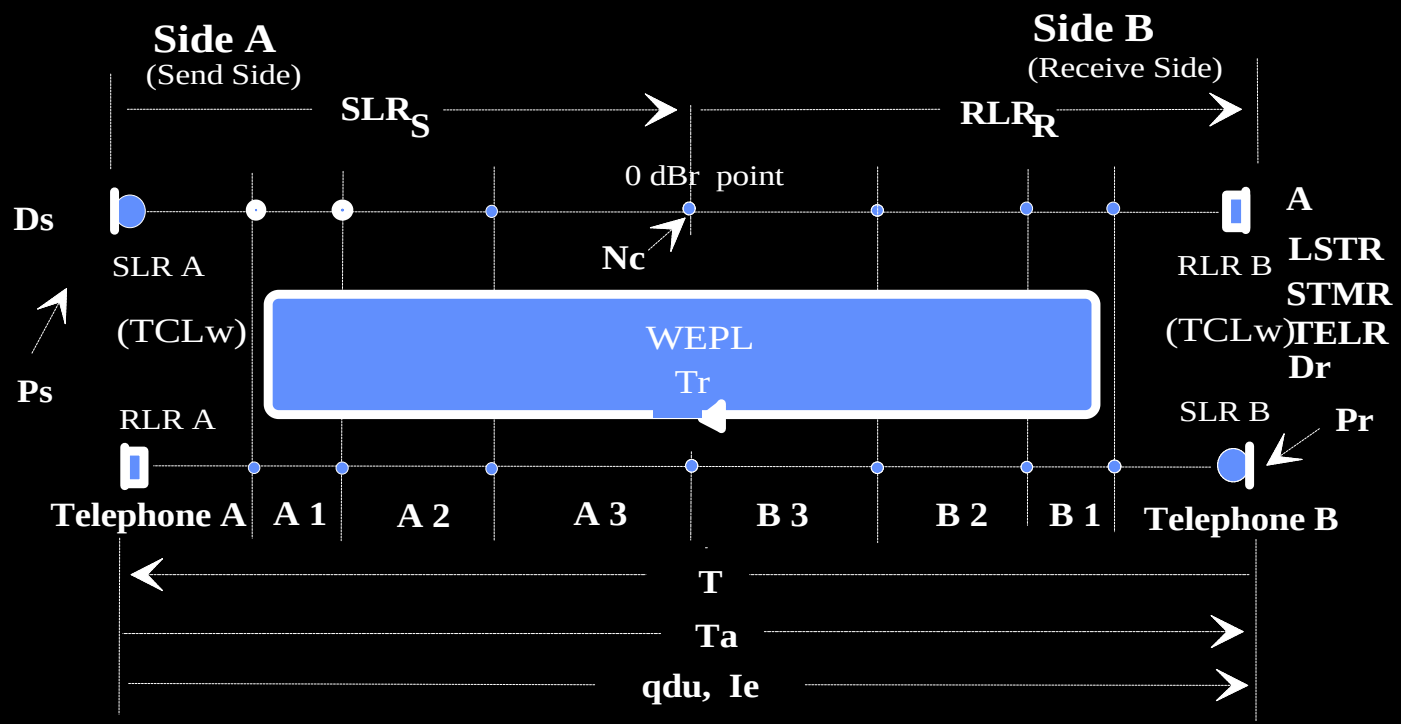


Figure 19/EG 201 050: Working configuration for fully digital connections