International Telecommunication Union

ITU-T Study Group 17

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ITU-T Study Group 17 Data Networks and Telecommunication Software

- Responsible for:
  - studies relating to data communication networks, and for studies relating to the application of open system communications including networking, directory and security
  - technical languages, the methods for their usage and other issues related to the software aspects of telecommunication systems.
  - Studies on modelling, specification and description techniques and on other software

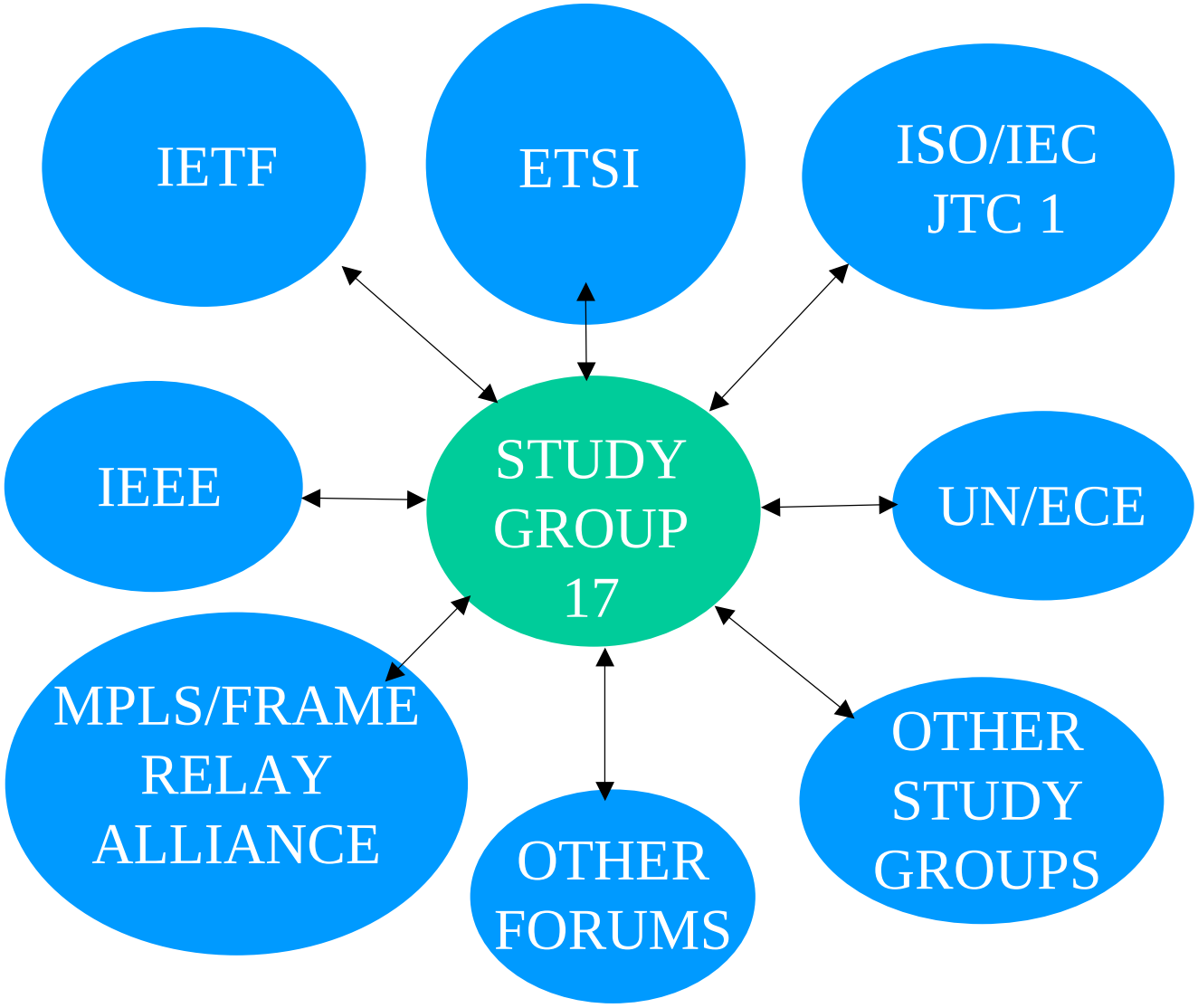
ITU-T Study Group 17
Data Networks and Telecommunication Software

- Lead Study Group on:
  - Frame relay
  - Communication system security
  - Languages and Description Techniques

Study Group 17

- Responsible for 278 ITU-T Recommendations - most of the X- and Z-series plus a few in E, F, and Q series
  - Several on the ITU "top 20" list - X.509, ASN.1, …
- Study Group structure:
  - WP1 Data Networks
  - WP2 Open Systems Technology
  - WP3 Languages and Notations
  - WP4 Quality and Methods
  - WP5 Distributed Object Technologies

Relations


IETF
ETSI
ISO/IEC JTC 1
IEEE
STUDY GROUP 17
UN/ECE
MPLS/FRAME RELAY ALLIANCE
OTHER FORUMS
OTHER STUDY GROUPS

Public Data Networks

- Dedicated Data Networks
  - Digital Data Networks – leased circuits and circuit switched
  - Packet Data Networks
  - Frame Relay Networks
- Service Definition
- Numbering and Routing
- Network Performance and QoS
- User-Network and Network-Network Interfaces
- Access and Interworking Procedures

Frame Relay

- UNI and NNI protocols mature
- Performance parameters in place
- Examples of ongoing work:
  - number plan interworking of public data networks with IP networks
  - performance when IP is carried over or interworked with a FR network
  - routing between public FR networks
  - FR / MPLS interworking

Open Communications

- IP-related Lower Layer Protocols
- End-to-end QoS Multicast Communications
- Directory (X.500-series)
- Security
- Open Systems Interconnection

IP-related Lower Layer Protocols and Mechanisms

- IP over SDH using LAPS (X.85)
- Ethernet over LAPS (X.86)
- Multiple Services Ring
- General arrangements for interworking between Public Data Networks and the Internet (X.271)
- Carrying an IP address (IPv4, IPv6) in an NSAP address (X.213)

End-to-End QoS Multicast

- Recommendations to enable applications to establish and control multicast communications involving M transmitters and N receivers with a rich set of QoS features over IP-based networks
- Approved: Multi-peer communications framework, Service definition, and Simplex multicast transport
- Future: Duplex, N-plex

Directory

- Updated edition (X.500-series)
- Public-key and attribute certificate frameworks (X.509)
- Enhancements in progress:
  - Friend Attribute
  - Distributed Paged Results
  - Maximizing alignment with LDAP
  - Additional support for Related Entries
  - Enhancement of public key and attribute certificates

Security

- Recommendations on security model, frameworks, protocols, and techniques approved 1991-2000
- Security workshop held May 2002, Seoul
- Draft Recommendations in preparation
  - X.css, Communication System Security
  - X.ism, Information Security Management
  - X.msec, Mobile Security
  - X.tb, Telebiometrics
- Compendia of Security Recommendations and definitions prepared

The ITU-T language family

- SDL - Specification and Description Language
- MSC - Message Sequence Chart
- eODL – extended Object Definition Language (adopted from TINA)
- ASN.1 - Abstract Syntax Notation One
- TTCN Testing and Test Control Notation

The ITU-T language family (new)

- URN - User Requirements Notation
  - UCM – Use Case Maps
  - GRL – Goal-oriented Requirement Language
- SDL as UML profile
- Still open – Incorporating Time and Performance into the languages

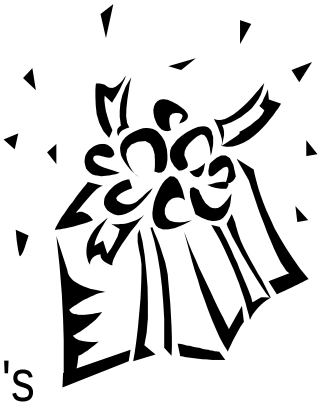
What makes the family different?

- Real-time, distributed communicating systems
- Formal, allowing verification and validation
- Many languages with a graphical syntax
- Commercial tool support
- Catering for users both in Industry and in Standards bodies (SDOs), e.g. ITU-T SG 11

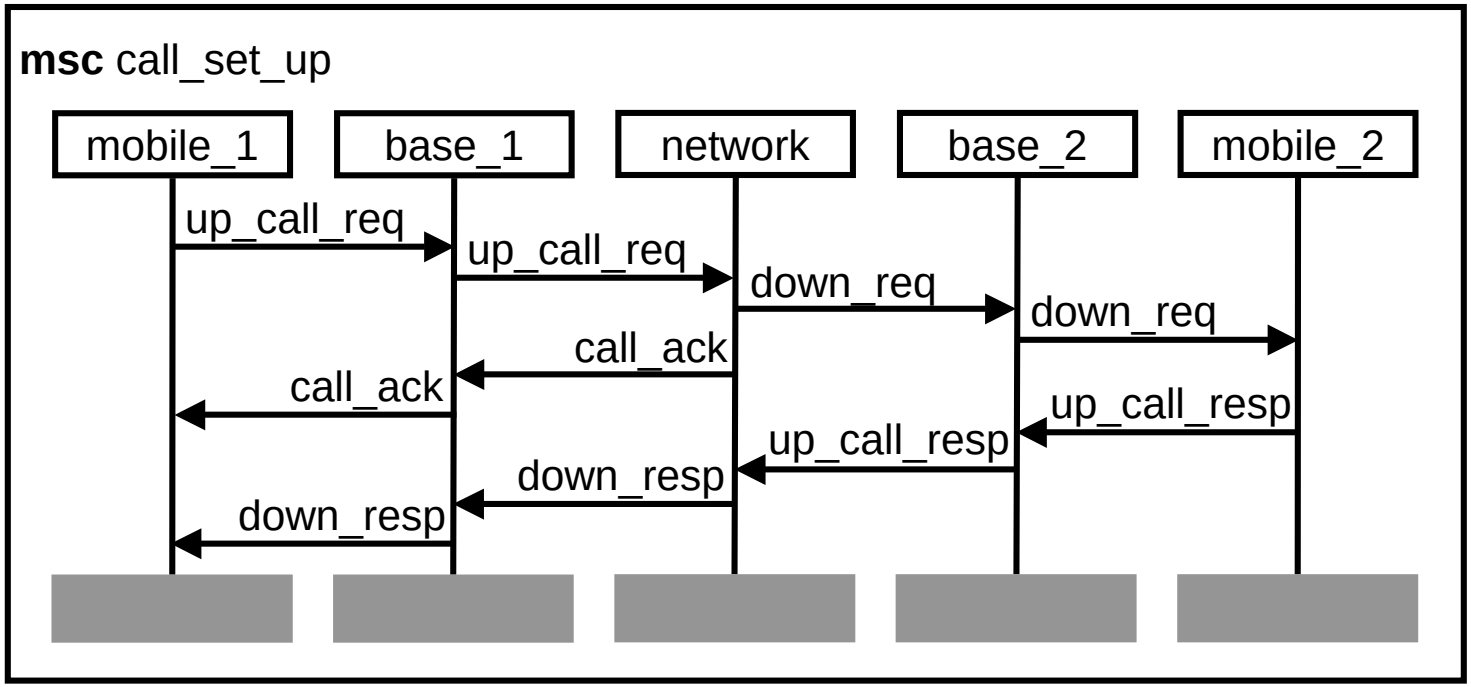
These are our
differentiating factors and strengths

ASN.1

- International standard : ITU-T X.680 to X.683 | ISO/IEC 8824-1 to 4
- Describes data exchanged between two communicating applications
- Several associated standardized encodings, such as:
  - efficient (binary) encoding: Packed Encoding Rules (PER)
  - canonical encoding for digital signatures: Distinguished Encoding Rules (DER)
  - XML encoding rules (XER)
- Mature, long record of reliability and interoperability
- ASN.1 is a critical part of our daily lives; it's everywhere, but it works so well it's invisible!
- Database of ASN.1 modules available on ITU website

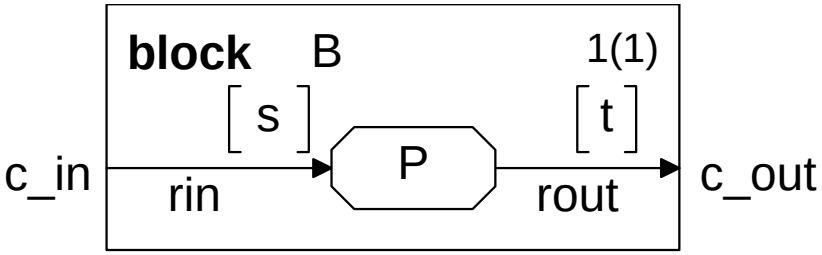


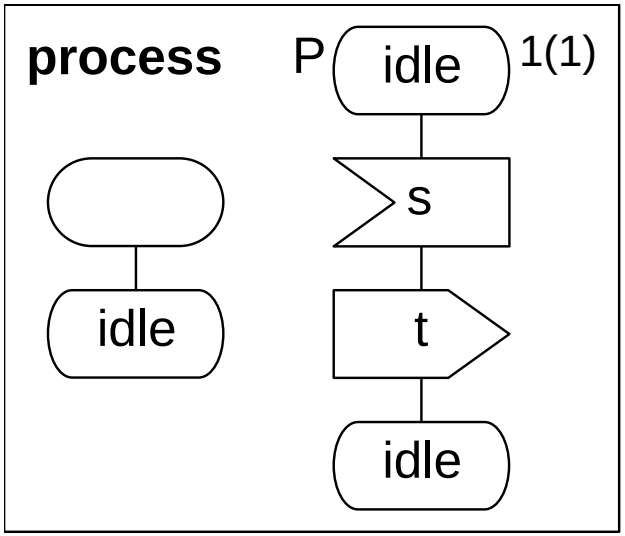
MSC



- Intuitive, widespread informal use
- Focuses on external interactions rather than internal behaviour
- Only notation that shows complete system interactions
- Good for partial specifications - i.e. scenarios
- Can be used independently of other languages
- Universal data language interface

SDL



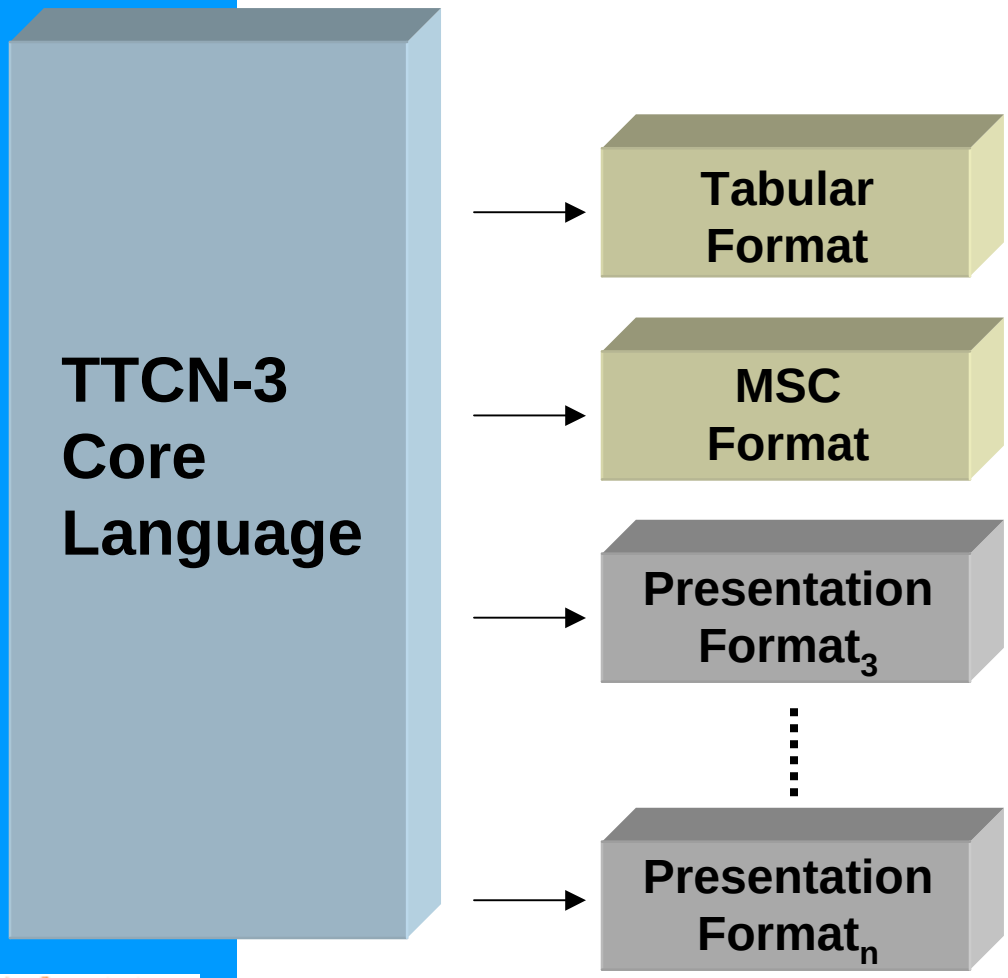


- Graphical specification language with a formal basis
- Allows early detection of errors and functional validation prior to implementation
- Widely used for protocol standards and in the telecoms industry
- Strong use as a high-level implementation language with code generation
- SDL played a major role in the standardisation of UML 2.0

TTCN-3

- Testing and Test Control Notation TTCN-3 is used to write detailed test specifications
- General purpose testing language
  - Conformance Testing
  - Interoperability testing
  - Robustness testing
  - Performance testing
  - regression testing
  - System testing
  - Integration testing, etc.
- Applicable to telecom and datacom testing

TTCN-3: different presentation formats



- Core format is a text based language
- Core can be viewed as text or in various presentation formats
- Tabular format for conformance testing
- Message Sequence Chart (MSC)format
- Other standardized formats in the future
- Proprietary formats

When are ITU-T languages the choice?

- Real-time systems that communicate, e.g. via protocols
- Quality is an issue:
  - Verification of consistency
  - Validation of behaviour
- Intuitive understanding via graphical syntax
- Protocol data formats are needed
- Automatic test case generation

Language Challenges Ahead

- Integrating ITU-T and non-ITU languages and methods, thereby providing various mixes adapted to user needs
- Expanding further into the Internet and mobility area, e.g. for protocols
- Expanding further into new application areas beyond telecommunications
- Strengthening the ITU-T best-sellers: ASN.1, MSC, SDL and TTCN
- Giving tool vendors of ITU-T languages a competitive edge with distinctive features

Information

- ITU web site: www.itu.int
- Study Group 17 page:
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