

Ecma International

January 2025

Standards@Internet speed

Ecma International

- [Technical Committees](#)
- [Process](#) (overview)
- [Members](#)
- [Liaisons](#)

TC12 (product safety)

- *To consider national and international safety regulations to establish appropriate safety standards for information technology equipment so that they are intrinsically safe and safe for operating and maintenance personnel.*

TC20 (EMC and EMF)

- *Electromagnetic compatibility and electromagnetic fields related to ICT and CE equipment.*

TC26 (acoustics)

- *To recommend standards for determining the noise outputs of different categories of individual items of information technology equipment intended for use in defined working environments; standards for determining total noise levels in the said working environments, these standards to include corresponding methods of measurement; preferred methods of predicting total levels if units of known noise output are installed together.*

TC31 (information storage)

- *To identify and develop the minimum number of standards necessary for data interchange and/or storage by means of digitally recorded systems, e.g. optical, magnetic and holographic systems (such as disks, cartridges,...) , and standards necessary for determining the life expectancy of such media.*
- *To study existing Ecma and ISO/IEC labeling / volume and file structure standards and, where necessary, initiate and pursue the development of volume and file structure standards.*

TC32 (multimedia coding and communications)

- *To prepare and maintain Ecma Standards and Technical Reports required in the field of multimedia coding and communications, including transmission.*
- *General items addressed by Standards and Technical Reports are architecture, service, protocol, interface, compatibility, management, media coding and applications aspects.*
- *To monitor, coordinate and pursue standardization as needed with regard to ISO/IEC JTC1 SC 6 and SC 29 and ITU-T SG16.*

TC38 (product-related environmental attributes)

- *To identify and describe the environmental attributes related to ICT (Information and Communication Technology) and CE (Consumer Electronics) products, during their entire life cycle, from conception to end-of-life treatment.*

TC39 (ECMAScript®)

- *Standardization of the general purpose, cross platform, vendor-neutral programming language ECMAScript®. This includes the language syntax, semantics, and libraries and complementary technologies that support the language.*

TC45 (Office Open XML formats)

- *The goal of the Technical Committee is to produce a formal standard for office productivity applications within the Ecma International standards process, which is fully compatible with the Office Open XML formats. The aim is to enable the implementation of the Office Open XML formats by a wide set of tools and platforms in order to foster interoperability across office productivity applications and with line-of-business systems. The Technical Committee is also responsible for the ongoing maintenance and evolution of the standard.*

TC46 (Open XML Paper Specification (OpenXPS®))

- The goal of the Technical Committee is to produce a formal standard for an XML-based electronic paper format and XML-based page description language which is consistent with existing implementations of the format called the Open XML Paper Specification (OpenXPS®). The Technical Committee uses the format called the Open XML Paper Specification (OpenXPS®) as a starting point with the aim to provide a standard, secure, and highly trustworthy format that enables a wide set of applications, devices, tools and platforms to implement compatible paginated-document workflows. An additional goal is to enable the interoperability of independently created software and hardware systems that produce, consume or otherwise process XPS content. The Technical Committee is responsible for the ongoing maintenance and evolution of the standard.*

TC49 (programming languages)

To standardize:

- *the programming language C # (C "sharp")*
- *the programming language Eiffel*
- *a Common Language Infrastructure (CLI)*
- *a CLI binding for C++*
- *additional programming languages with cross-language bindings*
- *additional vendor-neutral, cross-language programming platforms*

TC50 (close proximity electric induction data transfer)

- *High-speed close proximity wireless communications using longitudinal electric induction coupling*

TC51 (access systems and information exchange between systems)

- *Access system specifies a common language, architecture, interfaces and protocols for the interoperability between different (distributed) sub-systems for access to assets.*
- *Such assets may be physical such as buildings, transport means, care centres, computers or digitised assets and services e.g. health care.*
- *The access system specification describes a framework for existing and new systems that provide access to specific assets.*
- *Development of standards that enable close proximity communications such as, but not limited to, Near Field Communication Systems (NFC).*

TC52 (Dart)

- *To standardize the syntax and semantics of a modern, object oriented programming language called Dart as well as standardizing core libraries and complementary technologies that support the language. This work should not use patents or if so then only royalty free patents. To aid in achieving that objective, this TC uses a Royalty-Free Patent Policy similar that has been developed for use by TC39.*

TC53 (ECMAScript® modules for embedded systems)

- *Internet of Things (IoT) is becoming a reality, and with it, the appearance of small intelligent devices linked together by large data networks to data centers collecting and analyzing "big data". A sizable category of such intelligent devices are in form of so called wearables.*
- *Wearable sensor-based systems can comprise various types of small sensors, transmission modules and processing capabilities, and can thus capture various information ranging from monitoring of bodily activities to blood pressure, body temperature and heart rate in wearable devices, and external temperature, humidity, atmospheric pressure, location, and even altitude in small intelligent devices.*

TC54 (software and system transparency)

- *Software transparency refers to the practice of providing comprehensive and easily accessible information about the components and dependencies within a piece of software, how the software was manufactured, and the behaviours observed or attestations made by the organization that developed the software.*
- *This transparency aims to enhance security, compliance, and overall understanding of supply chain risk.*
- *Through software transparency, organizations can better manage software vulnerabilities, track open-source components, and foster a more secure and accountable software development and distribution ecosystem.*

ECMAScript® ([ECMA-262](#)) is the foundation for web sites that do more than display text and images.

Work is in progress on further development of the language

- *After intensive work, TC39 completed ECMAScript® 14 which was adopted by the General Assembly in June 2023.*

[ECMA-357](#) (**withdrawn**) extends ECMAScript® 4 Native XML (**E4X**) support to create, manipulate and navigate XML data without programmers having to learn XML.

Both standards are also published as ISO/IEC standards.

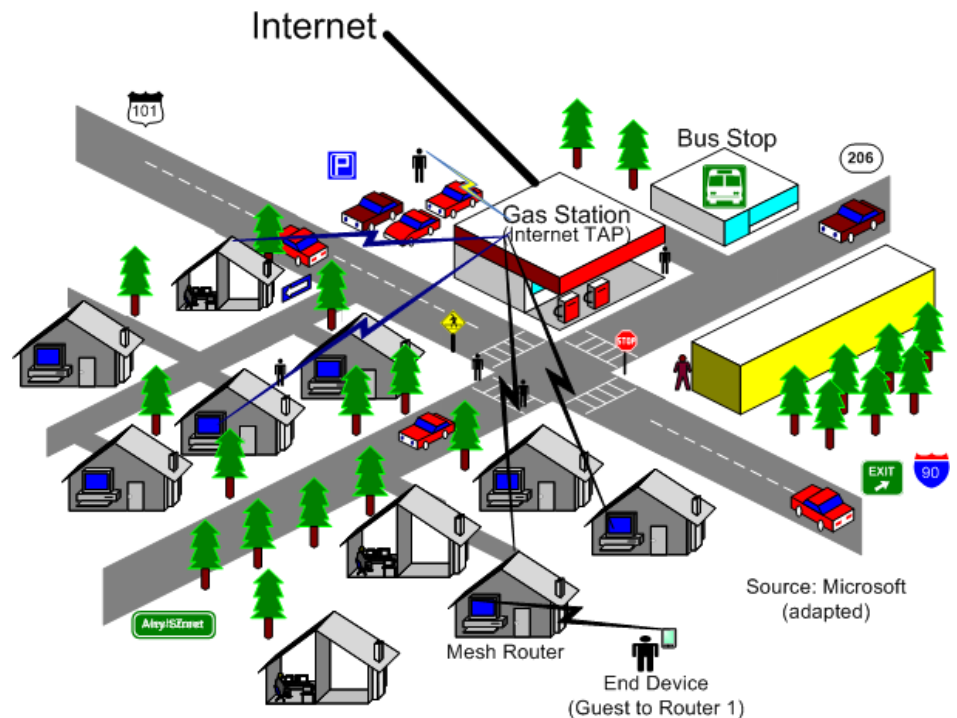
Former Ecma TC48-TG1 TV White Spaces Standard

- Is a **high-speed wireless** networking standard for use in the Television White Spaces: **broadcast television spectrum** not being used by licensed services at a given location;
- takes advantage of the **superior propagation characteristics** of the UHF-TV bands;
- Delivers more **robust wireless connectivity**, extend the coverage range and result in cost effective networking solutions, both indoors and outdoors.
- **Complies with** personal/portable device **FCC** rules to allow unlicensed radio transmitters to operate in spectrum white spaces. Others, e.g. OFCOM in the UK, are working on similar regulations;
- **Uses cognitive radio technology** to avoid interference with licensed services and other incumbent users; and
- Is based on the contribution from Cognitive Networking Alliance (CogNeA) that promotes white space devices in a collaborative and complementary fashion with Ecma's standard development.
- **ECMA-392** 1st edition approved in December 2009, 2nd edition in June 2012.

Former Ecma TC48-TG1

Internet access application

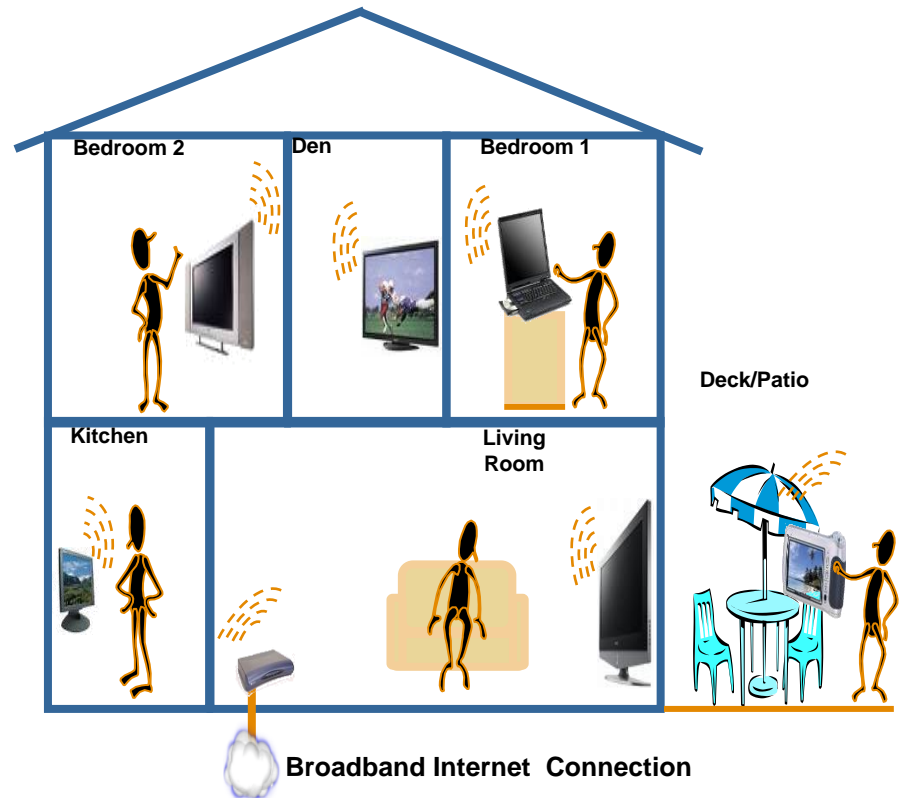
- *Television white spaces will provide more widely available and cost effective access to the internet in underserved markets.*
- *The superior propagation characteristics provide much greater coverage range than existing unlicensed technologies.*



Former Ecma TC48-TG1

Whole home application

- *Television white spaces will enable wireless distribution of high-quality high-definition television for whole home, vastly improving the DTV experience.*
- *The new standard will provide reliable and robust coverage anywhere in a home, while consuming much lower power.*

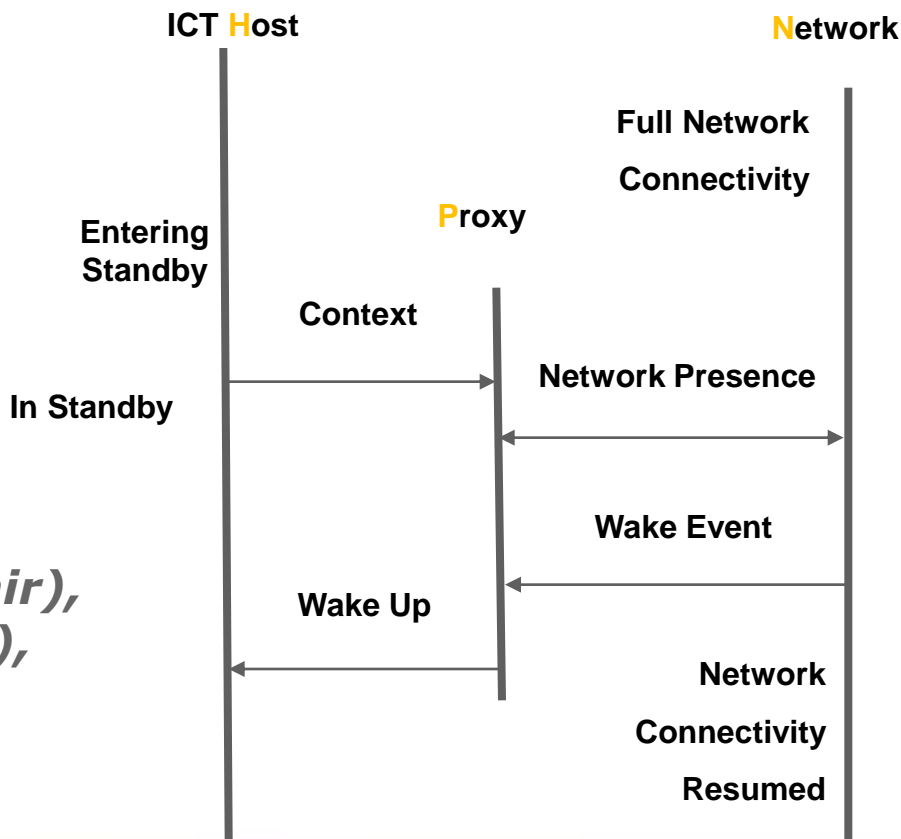


Proxies maintain Network presence so sleeping, higher powered, ICT Hosts reduce energy consumption:

Goals:

- *Specify Proxy behavior in Ecma/ISO/IEC Worldwide standard*
- *Adoption by US Energy Star (Computers) v06 in 2010/11*
- *EU Lot 26 Sleep State Regulations*

***Experts from Terra Novum (Chair),
LBNL (Vice Chair), Intel (Editor),
Hitachi, AMD, Microsoft, Sony,
Realtek, Apple, Oce, Lexmark....***



Hosts

Usages/Functional

PC Desktops/Laptops

Remote Desktop, Consumer
Manageability, File/Media
Sharing

Printers

On-Demand Print

Media PCs, TV,
Game Consoles

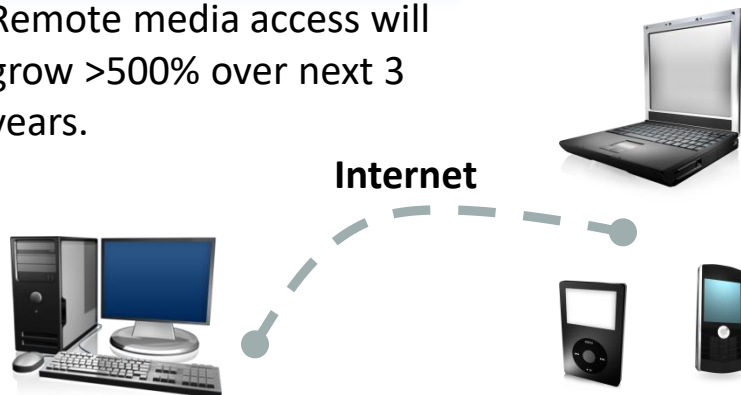
Wake-On User Trigger
On-demand downloads

Application and Services

Distributed Apps (SIP, Teredo,
Bonjour)

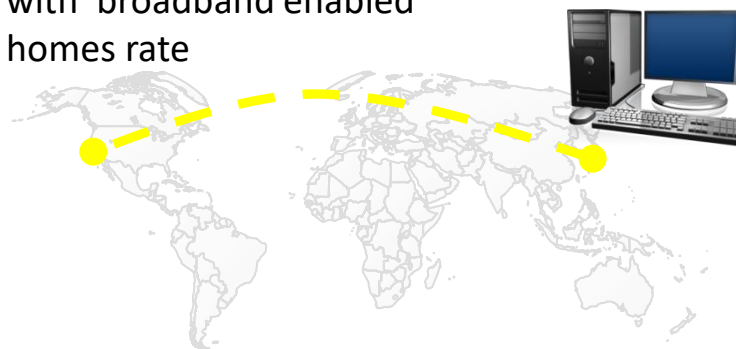
Remote Media Access

Remote media access will grow >500% over next 3 years.



Consumer Manageability

Client based services grow with broadband enabled homes rate



The Energy Challenge



Energy consumption has become key worldwide while desktop PCs waste nearly half their energy (source: Energy Star Computer System Data).

Broadband connected PCs are left in an active state 25% more, increasing energy use by 417% since 2001, assuming 10c per kWh .

ICT/desktop

Annual energy

“Always on” in S0

430-610 kWh*

24 X 7 responsive

S0 + 70% in S3

150-210 kWh

24 X 7 responsive

Annual energy savings

400 kWh (\$40)**

150+ million PCs*

60+ TWh generating cap (\$6B)

Plus millions of “networked
devices”

(printers, game consoles, TVs,
etc.)

**Huge energy savings
potential using network
proxy**

C# language and CLI

Several CLI and C# implementations

- *.NET Framework and Visual Studio .NET*
- *"SSCLI" – Shared source on XP, FreeBSD, OS X*
- *"Mono" – Open source on Linux*

Highlights

- *Generics support in C# and CLI*
- *Binding of C++* and CLI

C# is the first component language in the C/C++ family

- *Properties, methods, events*
- *Design-time and run-time attributes*
- *Integrated documentation using XML*

Multi language interoperability

- *C# is only one of the languages that Compile into Intermediate Language (CIL);*
- *Such languages can call functions in CIL libraries irrespective of the source language of the functions.*

Eiffel

- *The first Standard for Eiffel was published in June 2005; Published as ISO/IEC standard in 2006.*

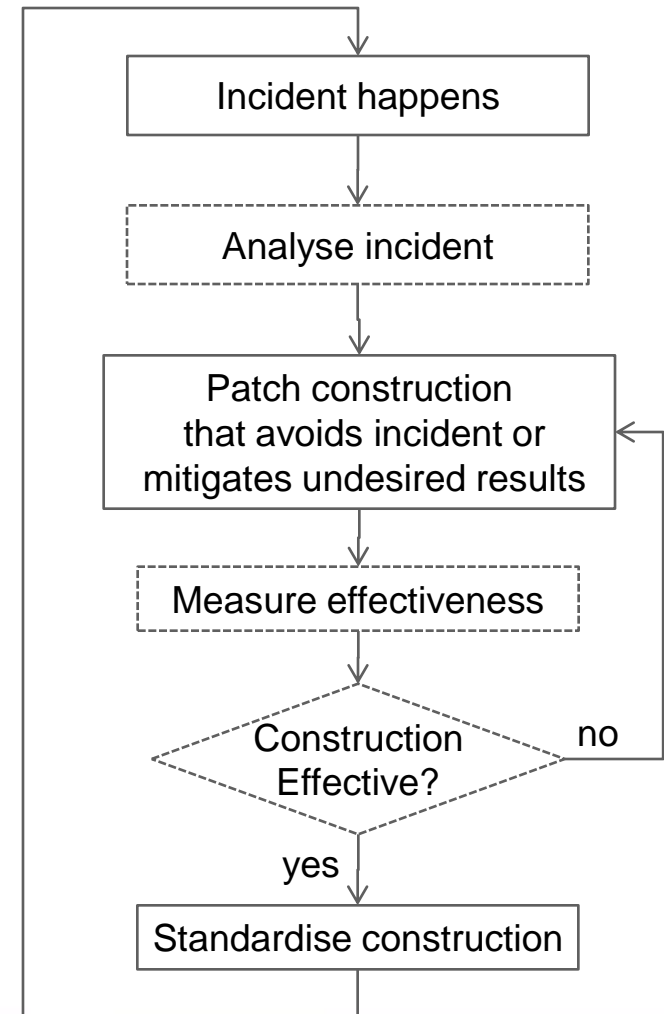
CSTA application-based communication control and monitoring

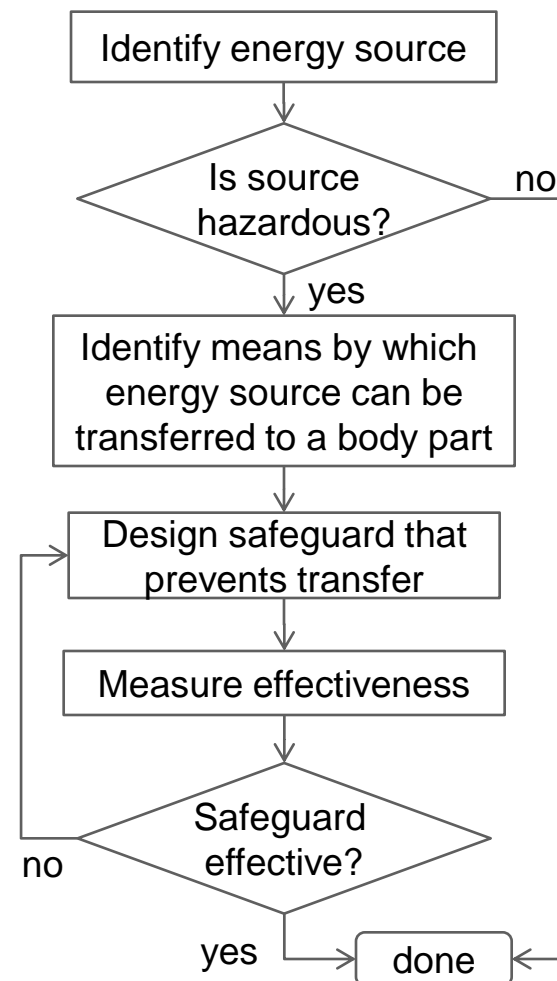
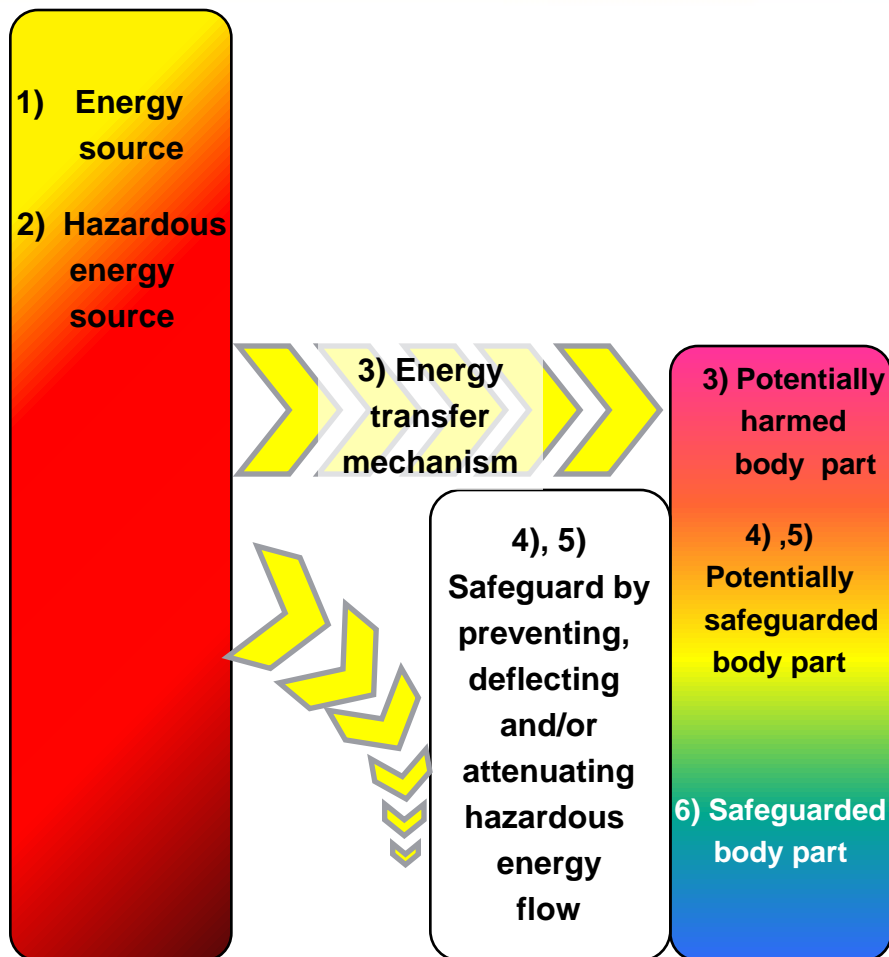
- *Object model in Unified Modelling Language (UML)*
- *Call control enhancements – advanced conferencing & collaboration*
- *Geographic location-based features*
- *Unified multimedia communications*
- *Web services*

Next Generation Corporate Networks (NGCN)

- *Interconnection with Next Generation carrier Networks (NGN) using SIP-based signaling;*
- *Mobile business communications, including mobility aspects of intra-NGCN connections and NGCN-NGCN, NGCN-NGN interconnections;*
- *NGCN-NGCN interconnection using peering & federations.*

Collaboration with ETSI, ISO/IEC JTC 1, ITU-T & IETF





TC20 standardises:

- **Limits and measuring methods** for high and low frequency interferences generated by IT and CE equipment.
- **Levels and measuring methods** for immunity of IT and CE equipment to radio-frequency interferences.
- **Assessment methods** for compliance of IT and CE equipment with requirements limiting human exposure to electromagnetic fields (EMF)

Current work, TC20:

- Uses A-liaison with CISPR for more direct contributions
- Prepares IT and CE industry positions for CISPR, IEC TC77 and CENELEC TC 210 for the maintenance of CISPR 13, 20, 22 and 24
- Contributions to the future CISPR 32 and 35
- Finalised 1st draft guide for assessment of human exposure to Electromagnetic Fields (EMF) from multimedia products in accordance with IEC/EN 62311 – in close cooperation with Japanese industry (VCCI and JEITA/EMF)

Near Field Communication (NFC) at 13,56 MHz for interconnection of peripherals and computers (akin to Radio Frequency Identification or RFID).

ECMA-340, NFCIP-1, 2002, NFC Interface and Protocol (ISO/IEC 18092)

ECMA-352, NFCIP-2, 2003, to bridge ISO/IEC 18092, 14443 and 15693

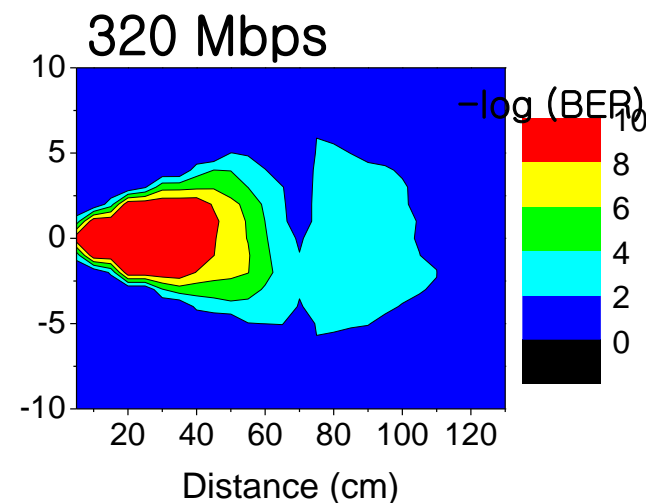
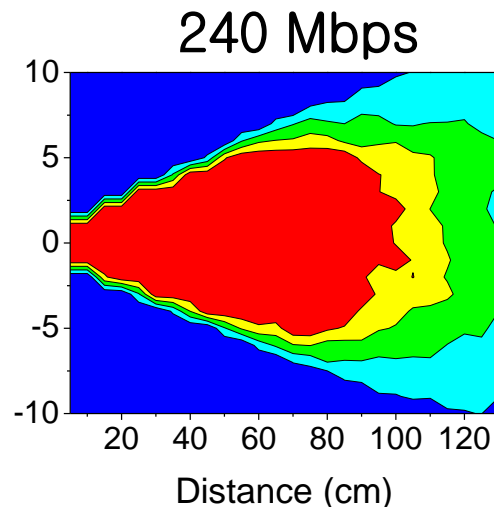
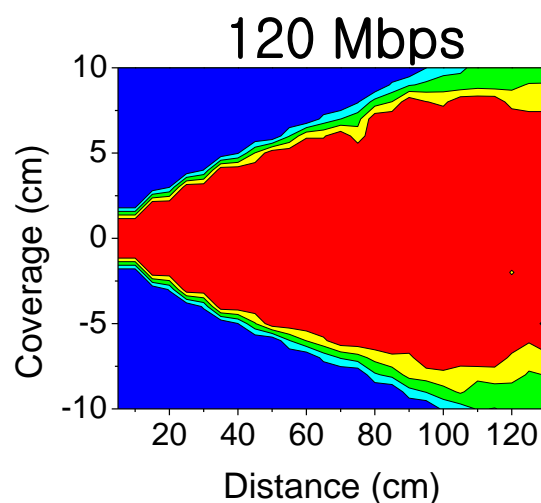
ECMA-356 / ECMA-362, 2004, NFCIP-1 -- RF Interface/Protocol Test Methods

ECMA-373, NFC-WI, 2007, two-wire Interface between a frontend and a transceiver; finalised NFC-FEC: front end commands for ECMA-373

NFC-SEC(urity) Services and Protocol and cryptography suite

General characteristics

- *Wavelength: between $\sim 400\text{nm}$ (750THz) - $\sim 700\text{nm}$ (428THz);*
- *Unregulated;*
 - *Visibility: Aesthetically pleasing;*
 - *Security: What You See Is What You Send;*
 - *Safe: Harmless for human body;*
 - *Line of Sight: Non-interference with other devices*
 - *High data rates:*



Personal Area Network (PAN)

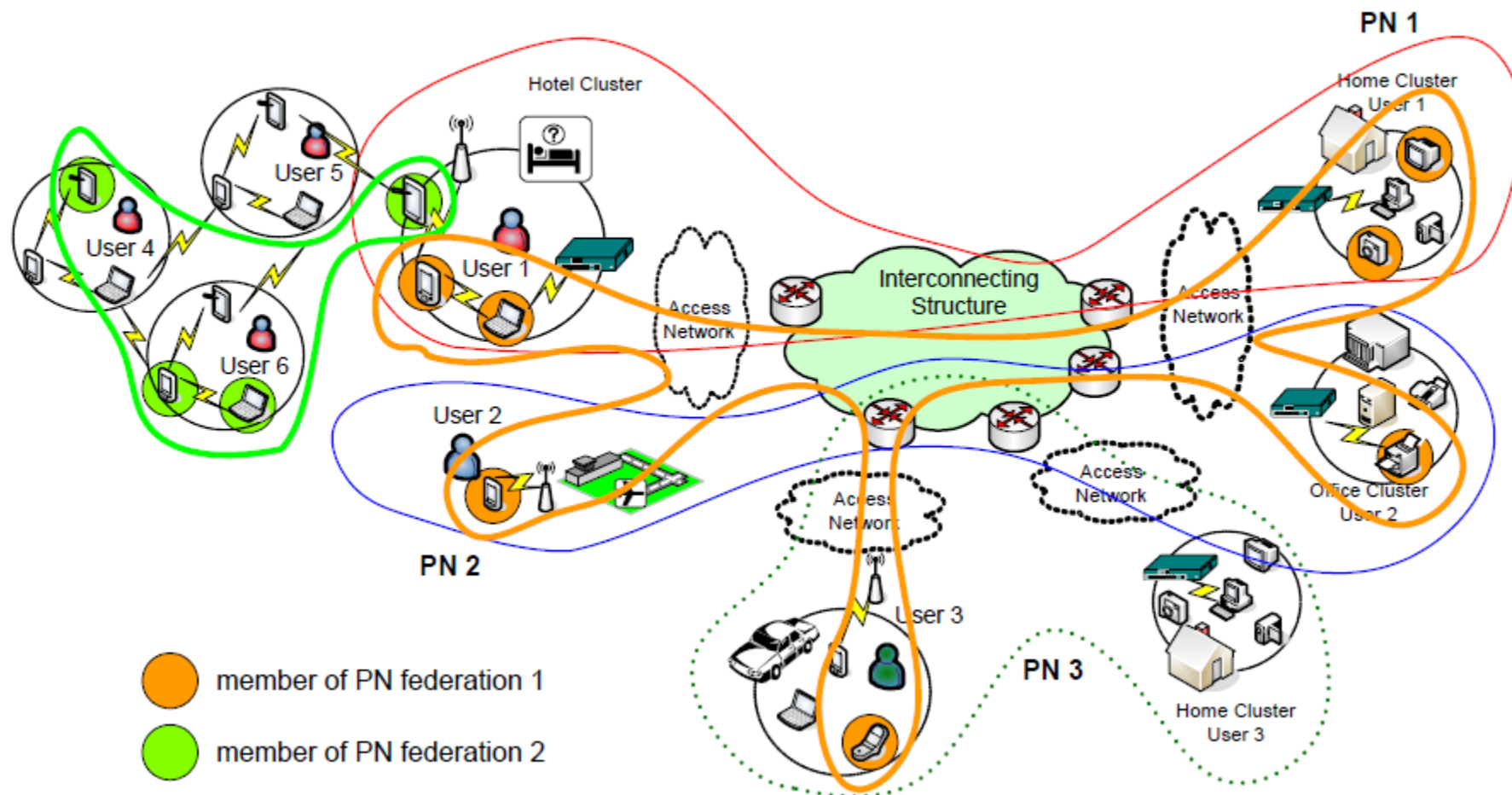
Network connecting devices in the close vicinity of a person/personal entity
→ *local scope*

Personal Network (PN)

Network that connects all nodes (of all PANs) of a person or private entity

- *User centred*
- *Secure and trustworthy*
- *Virtual vicinity* of local and remote resources
- *Self-organisation* of network connections
- *Heterogeneity* of technologies

Example: PNs & federations



60 GHz Communications

- *Wireless very high rate short range (up to 10 meters) – see [ECMA-387](#)*
- *To exploit low cost technology for up to 10 gigabit/second*
- *Focus on coexistence and interoperability between 3 device types ranging from - lowest cost point-to-point - to networked devices with trainable antennas, see [White Paper](#).*

Ultra WideBand (UWB) Communications

- *Updates in 2008 for better support of Bluetooth to
 - [ECMA-368](#), High Rate UWB PHY and MAC (ISO/IEC 26907)*
- *Detect and Avoid enhancements to use available spectrum*

Environmental Design considerations ECMA-341

- *Material & Energy Efficiency;*
- *Consumables & Batteries;*
- *Chemical Emission & Substances and Preparations needing special attention;*
- *Extension of Product Life Time & End of Life;*
- *Documentation & Design Checklist (e.g. ECMA TR/70).*

2nd edition (aligned with IEC ECD guide 114, recent EC Directives, legislation and ECMA TR/70 3rd edition) adds:

- *More granular (energy saving) modes;*
- *Updates on batteries and consumables;*
- *Guidance to reduce acoustic emissions.*

IEC and published the 2nd edition ECMA-341 as IEC 62075.

The 4th edition of ECMA-341 aims to align IEC 62075 and ECMA-341 again and to serve as the base for further revisions.

Determination of chemical emission rates (ECMA-328, ISO/IEC 28360)

- TC38-TG1 is integrating Measurement Methods on **Ultrafine Particle** Emissions considering actual findings of industrial and governmental research in the 5th edition

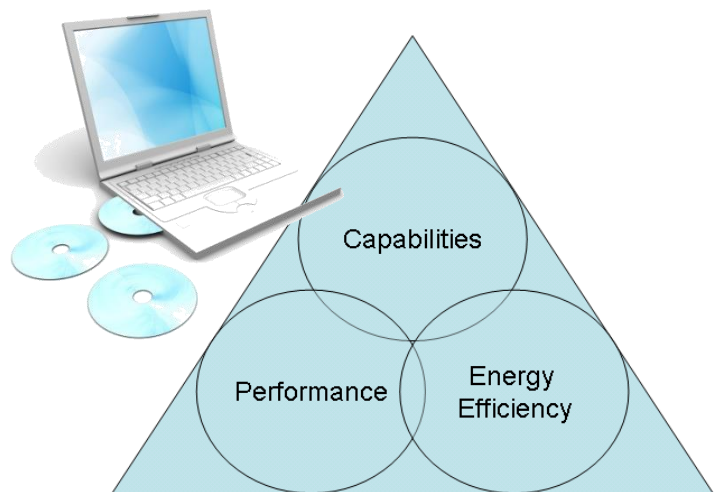
ECMA-370, TED or THE ECO DECLARATION in TC38-TG2

- Following publication of the 3rd edition of ECMA TR/70 "environmental attributes", Ecma TC38 harmonised TR/70 with the IT ECO declaration into ECMA-370
- extending the applicability to more geographic regions in JP-GO-370 WG for Japanese specifics attributes and legal references
- See also TC38's strategy plan

Compilation of an **energy efficiency standard** with initial focus on desktop and notebook computers

Innovative Approach: Considering computer energy efficiency performance rather than only energy consumption.

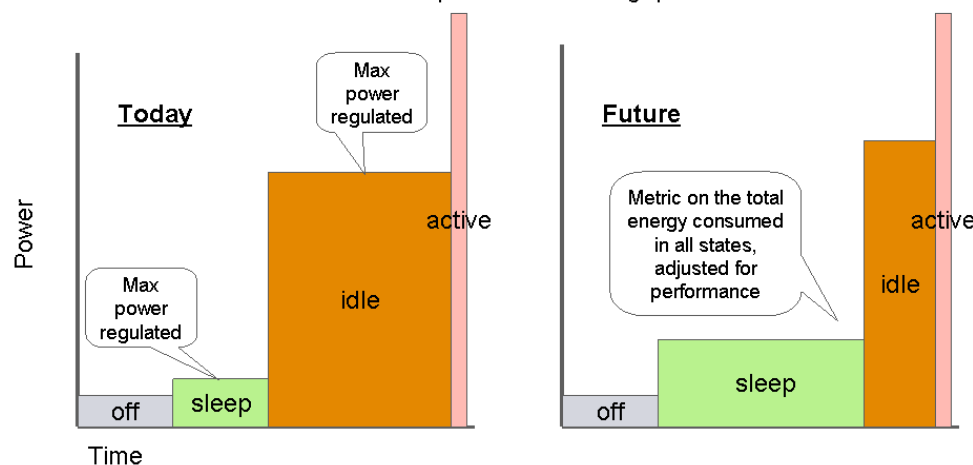
Definition of **PC standard configuration** (RAM, HDD capacity, graphic, network boards, etc...) for a given model or application or product segment or typical usage



Energy efficient performance

Which one is more energy efficient?

Hint: Add up the total area of the graphs



Universal 3D (U3D)

A new set of standards and TRs on a common extensible open file format and infrastructure for **3D CAD data which are repurposed for downstream visualisation applications**. Such applications are focused on non-engineering and non-design use, **e.g., training, sales/marketing, documentation, etc.**, further increasing the value of CAD.

Characteristics of U3D are:

- *Execution architecture to optimize run-time modification of geometry, reducing the need for data computation*
- *Model complexity can be adapted to the needed quality of performance*
- *Domain-specific compression, reducing file sizes*
- *Progressive data streaming and playback*
- *Key-frame and bones-based animation*
- *Extensibility of the U3D file format and run-time environment*
- *ECMA-363 is the first standard for the Universal 3D file format.*

Holographic Information Storage Systems (HISS)

Standards for HVD-ROM disk and HVD Recordable Cartridges were published at 12/2006 and 05/2007. Media with Permanent Holographic Information (PHI) are called media of the Phi-Type.

First generation media support capacities from 30 Gbytes (Cards/HVC) to 200 Gbytes (Disks): HVD-R (100 Gbytes) and HVD-ROM (200 Gbytes). Future media is expected to have capacities of 1 Tbyte and more.

[ECMA-375](#), [ECMA-377](#) and [ECMA-378](#)

Office Open XML Document Formats

- Designed to **represent all information of .doc, .ppt and .xls in XML**
- Default file format for Office 12
- Proposals for complementary or additional technology are considered for the evolution of the standard, under the provision of insured backward compatibility.

[ECMA-376](#) Edition 3 was approved in June 2011 and is technically aligned with ISO/IEC 29500 2nd edition.

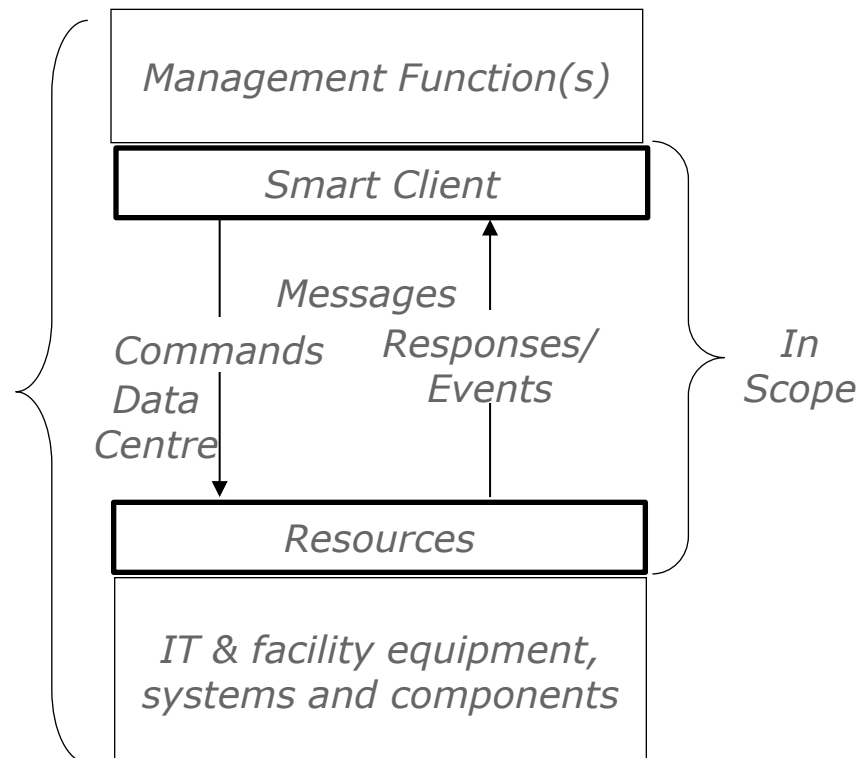
XML Paper Specification

Scope:

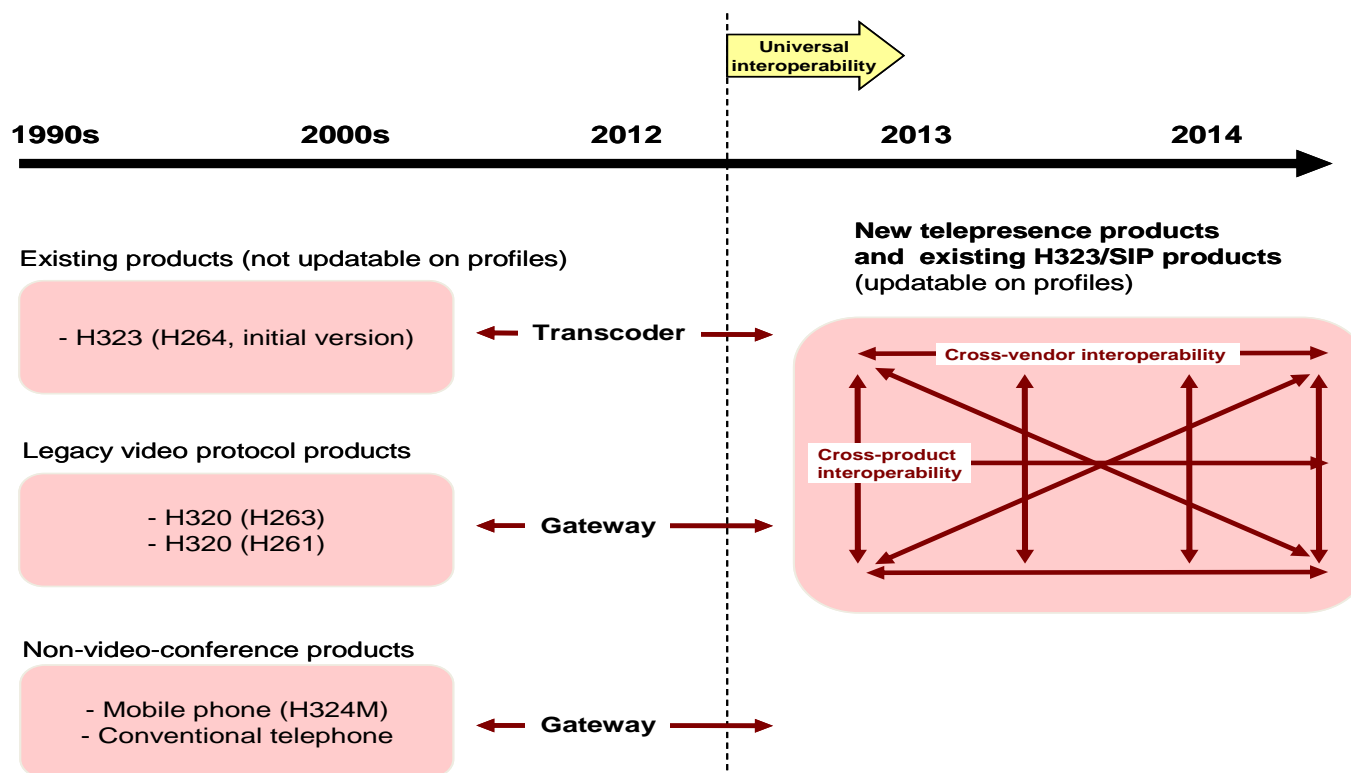
- produce a formal standard for an XML-based electronic paper format and **XML-based page description language** consistent with existing implementations of the XPS format
- enable the interoperability of independently created software and hardware systems that produce, consume or otherwise process XPS content
- build a framework for the ongoing evolution and maintenance of the standard

This standard was approved as [ECMA-388](#) in June 2009.

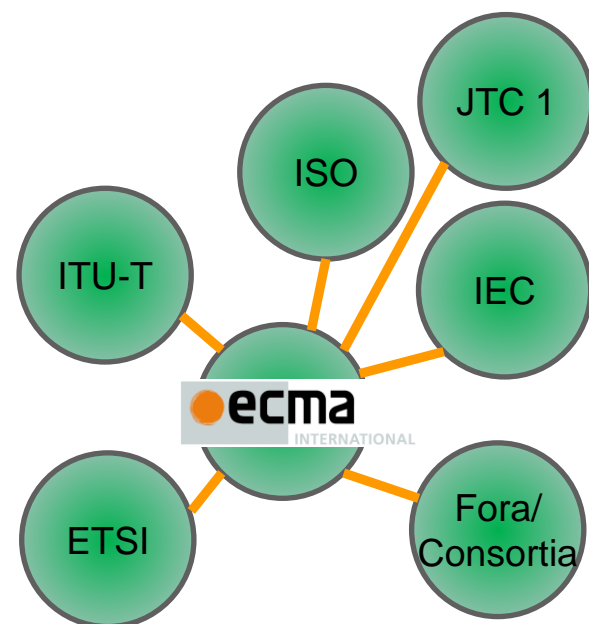
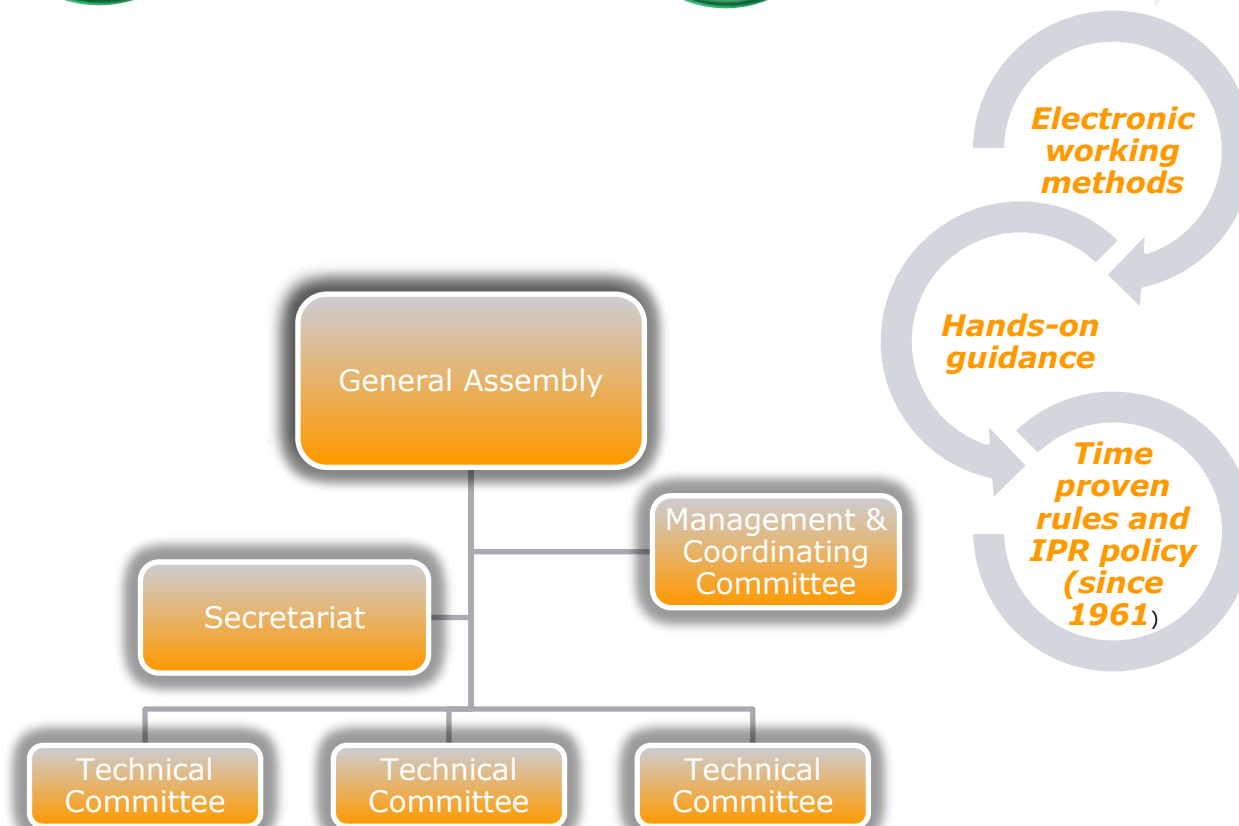
Monitoring and Control to optimise IT, power and cooling resources in data centres while guaranteeing the service levels for computing:



To improve interoperability and use of heterogeneous - high-end and CE - video conferencing systems:

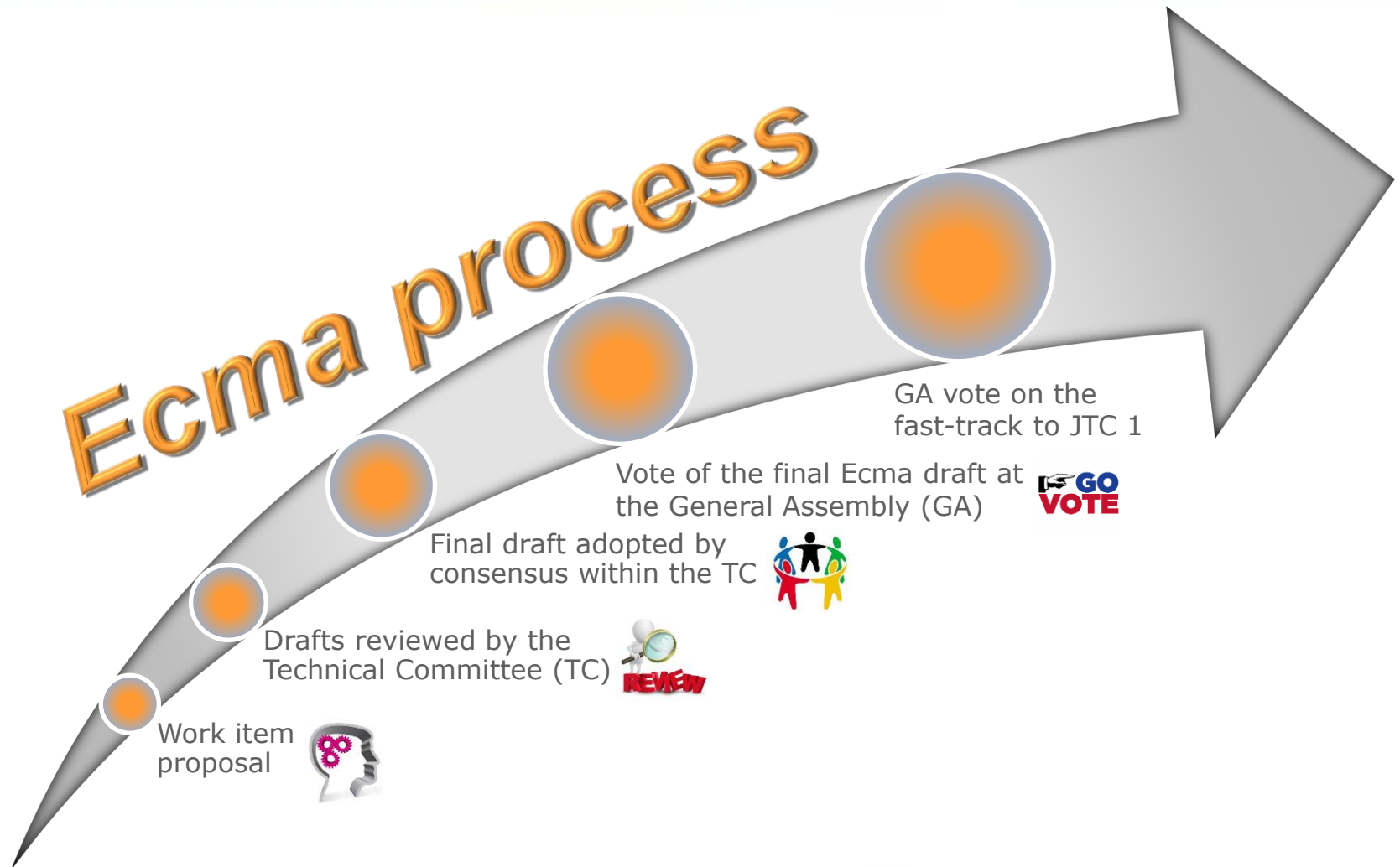


Two staged efficient process



Effective liaisons

Ecma International specification development process



Ordinary (Full)



Associate



SME Members



SPC Members



Not For Profit Members

AboutCode

Archive Disc
Test Center

Ben-Gurion University
of the Negev

DATLAS



Dr. G.R. Damodaran
College of Science

EPFL

ETH

IT R&D Global Leader
ETRI

法政大学
HOBEL University

humanitarian
TOOLBOX

imec

Imperial College
London

INDIANA UNIVERSITY



Indian Institute of Technology Delhi

Inria
ADAPTATION DU MONDE NUMÉRIQUE



IT University
of Copenhagen

NHK
Japan Broadcasting Corporation

JBMIA

Kahu Research

慶應義塾
Keio University

KOREA
UNIVERSITY



mozilla

GITDA

OpenJS
Foundation

OSB Open Source
Business
ALLIANCE
Bundesverband für digitale Geschäftsnetze e.V.



Osaka
Metropolitan
University

大阪産業大学
OSAKA SANJO UNIVERSITY

OWASP

PURDUE
UNIVERSITY



Small Fan Workshop
Association

TAMA UNIVERSITY
多摩大学

The LIBRARY
of CONGRESS

UEC
TOKYO



UNIVERSITY OF BERGEN



UC Santa Cruz

USF
UNIVERSITY OF
SOUTH FLORIDA

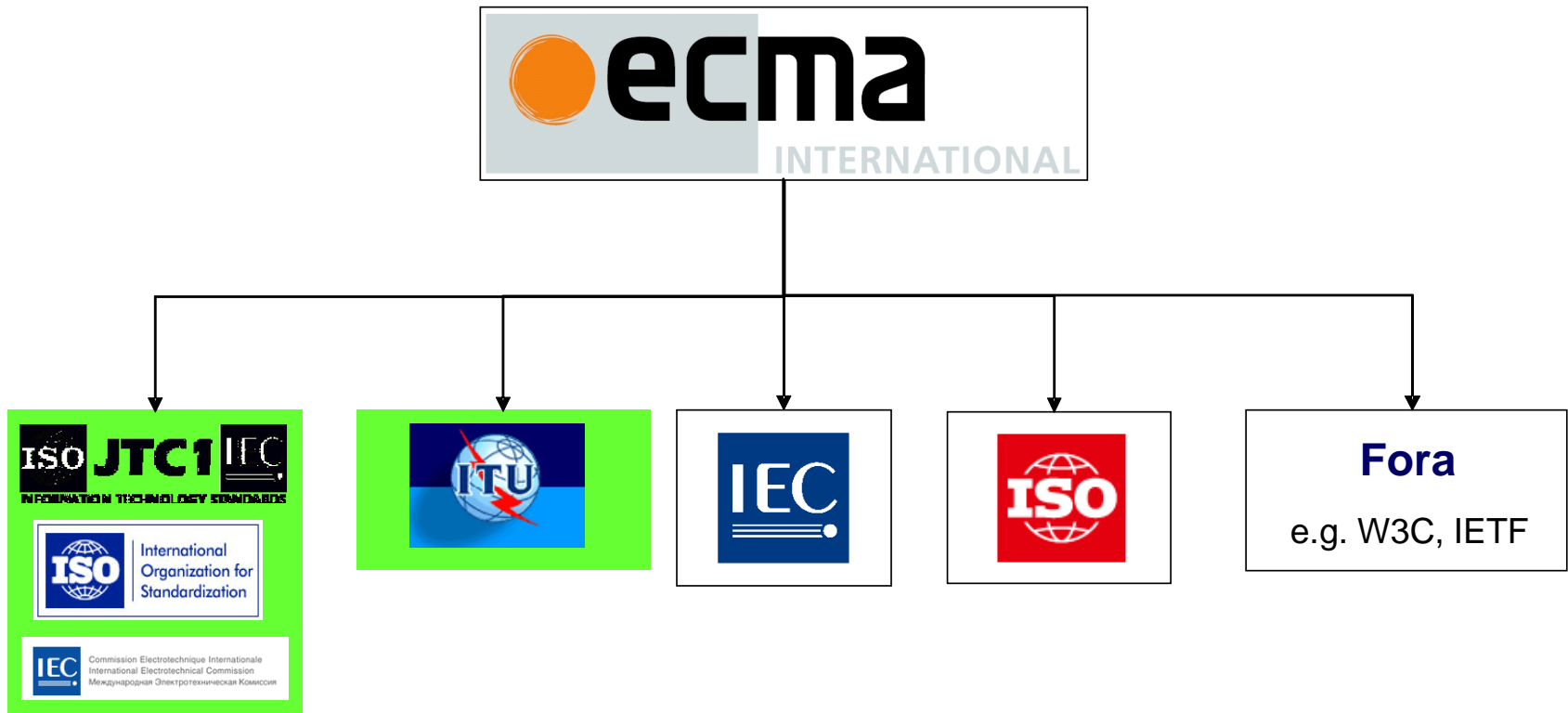


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Thank you!



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