Digital Product Passport:
circular economy, 
digital transformation of 
(ICT) products, 
e-waste management

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ITU-T Study Group 5: EMF, environment, climate action, sustainable digitalization and circular economy, develops standards on:

- Electromagnetic compatibility, resistibility and lightning protection
- Soft error caused by particle radiations
- Human exposure to electromagnetic fields
- Circular economy and e-waste management
- ICTs related to the environment, energy efficiency, clean energy and sustainable digitalization for climate actions

Active work items related to digital product passport, for ICT products:

- L.GDSPP “Requirements for a global digital sustainable product passport to achieve a circular economy” 2021
- L.D4PI “An information model for digital product information on sustainability and circularity” 2022

Technical alignment of standards with ETSI EE

Focus on circularity and transparency about environmental and climate change aspects
Importance of circular economy

We produce every year as many e-devices as people alive!

Global e-waste generated 2019
53.6 Mt
7.3 kg per capita

Global e-waste documented to be collected and properly recycled
17.4% | 9.3 Mt

Global e-waste flows that are not documented
82.6% | 44.3 Mt

Brominated Flame Retardants (BFR)
71 kt

(Hydro)chlorofluorocarbons (HCFCs)
96 Mt CO₂

Mercury
50 t

$57 billion USD
value of raw materials in e-waste

$10 billion USD
value of raw materials

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Improve the environmental sustainability of products, EC Sustainable Product Initiative 2020+

- Requirements related to product durability, reusability, upgradability and reparability, the presence of substances of concern in products, product energy and resource efficiency, recycled content in products, product remanufacturing and high-quality recycling, and for reducing products’ carbon and environmental footprints.

- Improve products environmental sustainability and access to sustainability information along the supply chain.

- Incentivise more sustainable products and business models to improve value retention.

- Improve application of sustainable product legislative framework.
Circular Economy

Eco-design of products and services
Reuse
Optimising life cycle and end-of-life
Selling repairable products
e-waste
Knowing helps digital information about products
Circular Economy

[Diagram showing the circular economy lifecycle, including stages such as pre-use, use, and post-use, with processes like packaging, distribution, assembly, design, manufacture, and material cycles.]
Digitalisation and Products

- Related Standards: material datasheets, databases, data carriers, storage, technical data interop protocols, etc.
- Digital transformation concerns most if not all product categories: EEE, ICT, but also plastics, textile, vehicles, buildings, etc.
Global digital sustainable product passport to achieve a circular economy

- Requirements of reporting key aspects related to circularity and transparency of an ICT or digital technology product in digital format.
- Facilitate and automate analysis of different ICT products based on circularity aspects.
- Facilitate preparation and reuse in the second-hand market and the reverse supply chain.
- Help manufacturers, governments, users to implement voluntary reporting and monitoring mechanisms to assess these qualities.
The Digital Product Passport

- **Elements (examples)**
  - A *unique product identifier*: product, batch, item, part
  - *Data carrier*: scan code in the product
  - *Details*:
    - Codes, compliance, economic operators
    - Env. performance: materials (critical, hazardous), energy, weight, durability
    - Info for buyers and end-users (maintenance, repair, parts), treatment (end-of-life), operators (handling), market surveillance, customs
    - Specific details for each product category (verticals)

- **Uses** (*need to know basis; evolutionary: already needed, used*)
  - More sustainable, circular products: design, reuse, ...
  - Traceability, transparency, verifiability: accountability
  - Informed choice: procurement
  - Incentives: EPR, reuse, return, recycling
  - Automation, smart decisions!
• Devices can be upgraded, reconfigured, repaired replacing parts:
  • Serialised, one chassis for life
  • Different hardware parts
  • What a recycler sees in an end-of-life product may be very different from the first product
This is the info for Digital Passport:
a305d06175:ab0f5fab03

Hardware
• Device
  • Chassis: Tower
  • Manufacturer: Dell Inc.
  • Model: Optiplex 790
  • SerialNumber: 1355B5J
  • Sku:
  • Type: Desktop
  • Version: 01
• Components
  • ['type': 'GraphicCard', 'model': '2nd Generation Core Processor Family Integrated Graphics Controller', 'manufacturer': 'Intel Corporation']
  • ['type': 'Motherboard', 'model': '0j3c2f', 'manufacturer': 'Dell Inc.', 'serialNumber': '1355B5J/C9736D4242H02.KU', 'version': 'A21', 'slots': 4, 'usb': 2, 'firewire': 0, 'serial': 1, 'pcon': 0, 'biosDate': '2018-02-11T23:00:00.000Z', 'ramSlots': 4, 'ramMaxSize': 32]
  • ['type': 'NetworkAdapter', 'model': '82579lm Gigabit Network Connection', 'manufacturer': 'Intel Corporation', 'serialNumber': 'D4:BE:D9:A2:12:86', 'variant': '04', 'speed': 1000, 'wireless': False]
  • ['type': 'Processor', 'model': 'Intel Celeron Cpu G530 @ 2.40ghz', 'manufacturer': 'Intel Corp.', 'brand': 'Celeron', 'speed': 1.677685, 'cores': 2, 'threads': 2, 'address': 64]
  • ['type': 'RamModule', 'model': 'Hmt351u64fr8c-h9', 'manufacturer': 'Hynix/hyundai', 'serialNumber': '157AAB3C', 'size': 4096, 'speed': 1067, 'interface': 'DDR3', 'format': 'DIMM']
  • ['type': 'RamModule', 'model': 'C15126-fd168b,cl8', 'manufacturer': '8598', 'serialNumber': 'E25555555', 'size': 4096, 'speed': 1067, 'interface': 'DDR3', 'format': 'DIMM']
  • ['type': 'SolidStateDrive', 'model': 'Ct240bx500ssd1', 'serialNumber': '1927E18B23E1', 'variant': 'R013', 'size': 240057.409536, 'interface': 'ATA']
  • ['type': 'SoundCard', 'model': '6 Series/c200 Series Chipset Family High Definition Audio Controller', 'manufacturer': 'Intel Corporation']

Proof-of-Concept
DPP Prototype

A working digital product passport for:
Chassis: a305d06175
Detailed hardware ID: ab0f5fab03
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L.1033: Guidance for institutions of higher learning to contribute in the effective life cycle management of e-equipment and e-waste

Thank you!

Questions?
Let us know!

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Example of standards supporting e-waste and circular economy

Frameworks and guidelines

- **ITU-T L.1030** E-waste management framework for countries
  - Summarizes the different steps that countries need to adopt in order to put in place an e-waste management system.

Reduction

- **ITU-T L.1023** Assessment method for circular scoring
  - Criteria for the assessment of circularity, definition of margin of improvement levels of ICT goods.

Take back systems

- **ITU-T L.1021** Extended producer responsibility – Guidelines for sustainable e-waste management
  - Describes and defines the role of EPR in dealing with e-waste.

Recycling

- **ITU-T L.1100** Procedure for recycling rare metals in information and communication technology goods
  - Basic guidelines regarding the importance of recycling rare metals and the procedures applied to preserve them.

Circular Economy

- **ITU-T L. 1020** Circular Economy: Guide for Operators and Suppliers on approaches to migrate towards circular ICT goods and networks
  - Provides guidance to operators and suppliers on how to improve circularity of products through supply chain actions.