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SERIES L: ENVIRONMENT AND ICTS, CLIMATE
CHANGE, E-WASTE, ENERGY EFFICIENCY;
CONSTRUCTION, INSTALLATION AND PROTECTION
OF CABLES AND OTHER ELEMENTS OF OUTSIDE
PLANT

E-waste and circular economy

**Effects of information and communication
technology-enabled autonomy on vehicles
longevity and waste creation**

Recommendation ITU-T L.1040

ITU-T L-SERIES RECOMMENDATIONS

ENVIRONMENT AND ICTS, CLIMATE CHANGE, E-WASTE, ENERGY EFFICIENCY; CONSTRUCTION, INSTALLATION AND PROTECTION OF CABLES AND OTHER ELEMENTS OF OUTSIDE PLANT

OPTICAL FIBRE CABLES	
Cable structure and characteristics	L.100–L.124
Cable evaluation	L.125–L.149
Guidance and installation technique	L.150–L.199
OPTICAL INFRASTRUCTURES	
Infrastructure including node elements (except cables)	L.200–L.249
General aspects and network design	L.250–L.299
MAINTENANCE AND OPERATION	
Optical fibre cable maintenance	L.300–L.329
Infrastructure maintenance	L.330–L.349
Operation support and infrastructure management	L.350–L.379
Disaster management	L.380–L.399
PASSIVE OPTICAL DEVICES	L.400–L.429
MARINIZED TERRESTRIAL CABLES	L.430–L.449
E-WASTE AND CIRCULAR ECONOMY	L.1000–L.1199
POWER FEEDING AND ENERGY STORAGE	L.1200–L.1299
ENERGY EFFICIENCY, SMART ENERGY AND GREEN DATA CENTRES	L.1300–L.1399
ASSESSMENT METHODOLOGIES OF ICTS AND CO2 TRAJECTORIES	L.1400–L.1499
ADAPTATION TO CLIMATE CHANGE	L.1500–L.1599
CIRCULAR AND SUSTAINABLE CITIES AND COMMUNITIES	L.1600–L.1699
LOW COST SUSTAINABLE INFRASTRUCTURE	L.1700–L.1799

For further details, please refer to the list of ITU-T Recommendations.

Recommendation ITU-T L.1040

Effects of information and communication technology-enabled autonomy on vehicles longevity and waste creation

Summary

Recommendation ITU-T L.1040 establishes guidelines and requirements for information and communication technology original equipment manufacturer vendors providing equipment to autonomous vehicles aiming to reduce the amount of future e-waste.

Recommendation ITU-T L.1040 analyses the e-waste risks and other sustainability indicators of autonomous vehicles and proposes how these potential challenges can be mitigated.

Recommendation ITU-T L.1040 utilizes information compiled from stakeholders that can provide good insights into the specified potential challenge.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

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In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Table of Contents

		Page
1	Scope	1
2	References.....	1
3	Terms	1
	3.1 Terms defined elsewhere	1
	3.2 Terms defined in this Recommendation.....	2
4	Abbreviations and acronyms	2
5	Conventions	2
6	Autonomous vehicles and e-waste	2
	6.1 Hazardous substances	2
	6.2 Eco-friendly materials and recyclable materials	2
	6.3 Standardized model and modular design.....	3
	6.4 Standardized essential components	3
	6.5 Reparability and maintainability	3
	6.6 Remanufacturing	3
	6.7 Replaceable software.....	3
	6.8 Upgrade compatibility	3
	6.9 Greenhouse gas emissions.....	3
7	Assessing the longevity of the ICT components of an autonomous vehicle	3
	7.1 Usage and mileage.....	3
	7.2 Remote monitoring.....	4
	7.3 Critical part.....	4
	7.4 Test and verification	4
	Annex A – Scorecard for guidelines and requirements evaluation.....	5
	Appendix I – Model for estimating ICT and battery waste generation from vehicles including autonomous and battery electric vehicles.....	8
	Bibliography.....	11

Introduction

Longevity (durability) is the most important aspect for lowering environmental impact in a circular economy. At the same time ~80 million new automotive vehicles – electric and others – are sold annually and ~1 billion are out on the streets. Other vehicles, like fleets of large commercial trucks and aircraft, account for ~250 million and ~25 000, respectively. All automotive autonomous vehicles (AVs) contain a significant value – and amount – of information and communication technology (ICT). The mass of ICT hardware (HW) per vehicle is expected to rise from ~20 kg to ~60 kg for AVs defined by software (SW) and other e-vehicles. The trend is that several (most) AVs (battery electric vehicles (BEVs) and others) will be equipped with ICT solutions that make them autonomous, i.e., they can "drive by themselves". There is a clear risk that the average lifetime of SW-defined AVs will be much shorter than for ordinary internal combustion engine vehicles (ICEVs). This could lead to additional e-waste creation.

There are several reasons why SW-defined AVs – usually BEVs – may have shorter lifetimes than conventional. In general, similar to consumer ICT goods, AV may involve high usability and frequent updates of both new models and SW. AVs and BEVs usually refer to next generation vehicles using more functionality than typical ICEVs.

High usability results in high kilometrage, which affects the lifespan of the vehicle. Compared to ICEVs, AVs and BEVs may provide an easier, less costly, and more comfortable driving experience. Therefore, private usage daily driving may increase sharply, leading to more wear.

As in the consumer ICT industry, new technologies will likely accelerate the innovation of new models in the AV industry. Moreover, the design and launch time of AVs may be short. Additionally, consumers may be encouraged to buy new AV models more often than ICEVs, and this might increase the amounts of ICT-related AV waste. It has been estimated that 10-12 years elapse before ICEVs are scrapped but only 4 years for AVs/BEVs. AVs or BEVs may have three times the amount (~60 kg/unit) of ICT HW as current ICEVs (~20 kg/ICEV unit).

The number of BEVs and fuel cell vehicles put on the market is expected to increase more rapidly from 2020 to 2030 or 2040 than between 2010 and 2020. In 2040, this may generate an additional 2 to 4 Mt of AV or BEV ICT waste and ~8 Mt battery waste. The model used to estimate certain waste and greenhouse gases from production of vehicles globally is discussed in Appendix I.

SW upgrades may overtake those of HW. AVs rely highly on the control system, and like technology upgrades, those for SW may be required in a shorter period, while vehicle HW – such as components, parts, and sensors – cannot be replaced as easily or as quickly.