

ISO/IEC 30141:2024-08 (E)

Internet of Things (IoT) - Reference architecture

Contents	Page
FOREWORD.....	5
INTRODUCTION.....	7
0.1 General.....	7
0.2 About Internet of Things (IoT)	7
0.3 IoT sources of information.....	7
0.4 General principles of a reference architecture	8
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	9
4 Abbreviated terms	9
5 IoT RA context.....	10
5.1 Overview.....	10
5.2 Stakeholders and concerns	11
6 IoT RA viewpoints and views	12
6.1 Overview.....	12
6.2 Foundational IoT viewpoint and views	13
6.2.1 Foundational IoT viewpoint.....	13
6.2.2 Foundational IoT view.....	13
6.3 Business viewpoint and view.....	19
6.3.1 Business viewpoint.....	19
6.3.2 Business view.....	19
6.4 Usage viewpoint and view	21
6.4.1 Usage viewpoint	21
6.4.2 Usage view.....	21
6.5 Functional viewpoint and view.....	22
6.5.1 Functional viewpoint.....	22
6.5.2 Functional view.....	23
6.6 Trustworthiness viewpoint and view	25
6.6.1 Trustworthiness viewpoint.....	25
6.6.2 Trustworthiness view	26
6.7 Construction viewpoint and views	29
6.7.1 Construction viewpoint.....	29
6.7.2 Construction view	31
6.7.3 IoT component pattern.....	32
Annex A (normative) Additional IoT construction patterns	38
A.1 General.....	38
A.2 Reference Architecture Model Industrie 4.0 (RAMI 4.0) pattern	38
A.3 Dynamic IoT system pattern.....	40
A.4 IoT enterprise system pattern.....	43
A.5 IoT enterprise networking pattern.....	45
A.6 IoT enterprise usage pattern	47
Annex B (informative) Guidance on the use of ISO/IEC/IEEE 42010:2022.....	53

B.1	Overview.....	53
B.2	Systems and architectures.....	53
B.3	Elements in ISO/IEC/IEEE 42010:2022 used in ISO/IEC 30141 IoT reference architecture description.....	53
B.3.1	Overview.....	53
B.3.2	Stakeholders, perspective, and concerns.....	54
B.4	Viewpoints, model kinds, legends, correspondences, and correspondence methods.....	55
B.5	Views and models.....	55
B.6	Correspondences.....	55
Annex C (informative)	Characteristics for IoT systems in particular contexts.....	56
C.1	Common characteristics.....	56
C.1.1	Legacy support.....	56
C.1.2	Network connectivity.....	56
C.1.3	Unique identification.....	56
C.1.4	Well-defined components.....	57
C.1.5	Auto-configuration.....	57
C.1.6	Content-awareness.....	57
C.1.7	Context-awareness.....	57
C.1.8	Discoverability.....	57
C.1.9	Manageability.....	58
C.1.10	Network management and operation.....	58
C.1.11	Real-time capability.....	58
C.1.12	Self-description.....	59
C.1.13	Service subscription.....	59
C.2	Characteristics related to trustworthiness.....	59
C.2.1	Data characteristics – volume, velocity, veracity, variability, and variety.....	59
C.2.2	Protection of personally identifiable information (PII).....	60
C.2.3	Flexibility.....	60
Bibliography.....		61
Figure 1 – Using the IoT RA standard.....		8
Figure 2 – Relationship between IoT component, IoT system and IoT environment.....		14
Figure 3 – Example of IoT environment.....		16
Figure 4 – External facing functions.....		21
Figure 5 – Internal model of abstract function classes.....		23
Figure 6 – Legend used in the trustworthiness view.....		26
Figure 7 – IoT architecture construction view.....		31
Figure 8 – Capabilities of an IoT component.....		32
Figure A.1 – RAMI 4.0.....		39
Figure A.2 – DSC components.....		41
Figure A.3 – Message flow in DSC.....		42
Figure A.4 – Home smart air cleaning service.....		42
Figure A.5 – Example system deployment model.....		43
Figure A.6 – Networking model.....		45
Figure A.7 – Roles present when the system is in use.....		48
Figure A.8 – IoT service provider subroles and activities.....		48

Figure A.9 – IoT service developer subroles and activities	49
Figure A.10 – IoT subroles and activities	50
Figure A.11 – Activities of device and application development	50
Figure A.12 – Using device data for security-related analytics and operations.	51
Figure B.1 – Conceptual model of an architecture description	54
Table 1 – List of viewpoints, stakeholders, and concerns	11
Table 2 – Foundational IoT viewpoint.....	13
Table 3 – Business viewpoint.....	19
Table 4 – Usage viewpoint.....	21
Table 5 – Functional viewpoint.....	23
Table 6 – Trustworthiness viewpoint	26
Table 7 – Construction viewpoint	30
Table 8 – Construction pattern legend	30
Table 9 – IoT component pattern	32
Table 10 – Additional information on IoT component capabilities	33
Table 11 – Key capability transformations.....	35
Table 12 – IoT system pattern.....	36
Table A.1 – RAMI 4.0 pattern.....	38
Table A.2 – Dynamic IoT system pattern.....	40
Table A.3 – IoT enterprise system pattern.....	43
Table A.4 – IoT enterprise networking system.....	45
Table A.5 – IoT enterprise usage pattern	47
Table A.6 – Overview of activities and roles.....	51
Table A.7 – Overview of enterprise activities and roles	52