

# ISO/IEC 29180:2012-12 (E)

## Information technology - Telecommunications and information exchange between systems - Security framework for ubiquitous sensor networks

---

<b>Contents</b>		<b>Page</b>
Reference number INTERNATIONAL STANDARD 29180 First edition 2012-12-01 Information technology -- Telecommunications and information exchange between systems -- Security framework for ubiquitous sensor networks Technologies de l'information -- Télécommunications et échange d'informations entre systèmes -- Cadre de sécurité pour réseaux de capteurs ubiquitaires COPYRIGHT PROTECTED DOCUMENT electronic or mechanical, including photocopying and microfilm, without permission in writing from either ISO at the address below or ISO's member body in the country of the requester. ISO copyright office Case postale 56 CH-1211 Geneva 20 Tel. + 41 22 749 01 11 Fax + 41 22 749 09 47 E-mail <a href="mailto:copyright@iso.org">copyright@iso.org</a> Web <a href="http://www.iso.org">www.iso.org</a> Published in Switzerland		
	<b>CONTENTS</b>	<b>1</b>
	<b>1 Scope</b> .....	<b>1</b>
<b>2</b>	<b>Normative references</b> .....	<b>1</b>
<b>2.1</b>	<b>Identical Recommendations</b> ..... International Standards	<b>1</b>
<b>2.2</b>	<b>Paired Recommendations</b> ..... International Standards equivalent in technical content	<b>1</b>
<b>2.3</b>	<b>Additional references</b> .....	<b>1</b>
<b>3</b>	<b>Definitions</b> .....	<b>2</b>
<b>3.1</b>	<b>Terms defined elsewhere</b> .....	<b>2</b>
<b>3.2</b>	<b>Terms defined in this Recommendation</b> ..... International Standard	<b>2</b>
<b>4</b>	<b>Abbreviations</b> .....	<b>3</b>
<b>5</b>	<b>Conventions</b> .....	<b>4</b>
<b>6</b>	<b>Overview</b> .....	<b>4</b>
<b>7</b>	<b>Threats and security models for ubiquitous sensor networks</b> .....	<b>7</b>
<b>7.1</b>	<b>Threat models in sensor networks</b> .....	<b>7</b>
<b>7.2</b>	<b>Threat models in IP networks</b> .....	<b>10</b>
<b>7.3</b>	<b>Security model for USNs</b> .....	<b>10</b>
<b>8</b>	<b>General security dimensions for USN</b> .....	<b>10</b>
<b>9</b>	<b>Security dimensions and threats in ubiquitous sensor networks</b> .....	<b>11</b>
<b>9.1</b>	<b>Security dimensions and threats for the message exchange in sensor networks</b> .....	<b>11</b>
<b>9.2</b>	<b>Security dimension and threats for the message exchange in the IP network</b> .....	<b>14</b>
<b>10</b>	<b>Security techniques for ubiquitous sensor networks</b> .....	<b>14</b>
<b>10.1</b>	<b>Key management</b> .....	<b>14</b>
<b>10.2</b>	<b>Authenticated broadcast</b> .....	<b>15</b>
<b>10.3</b>	<b>Secure data aggregation</b> .....	<b>16</b>
<b>10.4</b>	<b>Data freshness</b> .....	<b>17</b>
<b>10.5</b>	<b>Tamper-resistant module</b> .....	<b>17</b>
<b>10.6</b>	<b>USN middleware security</b> .....	<b>17</b>
<b>10.7</b>	<b>IP network security</b> .....	<b>17</b>
<b>10.8</b>	<b>Sensor node authentication</b> .....	<b>18</b>
<b>10.9</b>	<b>Privacy protection in sensor networks</b> .....	<b>18</b>
<b>11</b>	<b>Specific security functional requirements for USN</b> .....	<b>18</b>
<b>11.1</b>	<b>Mandatory functional requirement</b> .....	<b>18</b>
<b>11.2</b>	<b>Recommended functional specifications</b> .....	<b>18</b>

11.3	Optional functional specifications .....	18
Annex A - Key management in sensor networks .....		20
A.1	Threat time .....	20
A.2	Key management classes .....	20
A.3	Key schemes .....	21
Annex B - Authenticated broadcast in sensor networks: $\mu$ TPC .....		23
B.1	Construction of $\mu$ TPC .....	23
B.2	Construction of $\mu$ TPCT .....	24
B.3	Authenticated broadcast .....	25
Annex C - Authentication mechanisms in sensor networks .....		26
C.1	XOR-based mechanism .....	26
C.2	Hash-based mechanism .....	27
C.3	Public key-based authentication .....	29
Annex D - Secure data aggregation in sensor networks .....		32
D.1	Elect aggregation node and supervisor .....	32
D.2	Implementation of supervisor functions .....	33
D.3	Upload supervising message .....	33
D.4	Determine the trust of aggregation nodes .....	33
D.5	Send revocation message .....	33
Bibliography .....		34