ISO/IEC JTC 1/WG 7
Working Group on Sensor Networks

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Draft Disposition of Comments on ISO/IEC WD 29182-1 (WGSN-N089) | **Date: 2011/01/05** | **Document: WGSN-132**

MB[1]	Clause / subclause (e. g. 3.1)	Para-graph/ Figure/ Table (e. g. Table 1)	Type of com-ment[2] (e. g. ed)	Comments: Justification for change	Text of proposed change	*DRAFT – For Comment* **Observations of the secretariat** on each comment submitted
US1	Page iii	Item 6.4	ed	The word “user” needs to be pluralized.	Replace “Types of user” by “Types of users”.	**Accepted**
US2	Page iii	Item 6.9	ed	The word communication is typically used in its plural form in contexts like this.	Replace “Intra-sensor-network communication” by “Intra-sensor-network communications”.	**Accepted**
US3	Page iii	Item 6.10	te	Energy efficiency is a more appropriate term than power efficiency in this context. What matters is how much energy a sensor node has to expend to get certain task done. A sensor node with lower power consumption that takes much longer than another node to get certain task done consumes more energy in the final analysis.	Change the name of this subsection to “Energy Efficiency and Operating Lifetime”.	**Accepted**
US4	Page iii	Item 6.13	ed	Need a “-“, because this is a hyphenated word.	Replace “User oriented” by “User-oriented”.	**Accepted**
CA1	Foreword		ge	Are all 7 planned parts of the standard to be normative? Are some parts informative only? We note in Clause 2 (Normative references) only parts 2 through 5 are referenced.	Please clarify the normative/informative status of the parts.	**Resolved** ITU-T F.744, ISO/IEC 29182-3,4,5 are moved and ISO/IEC 29182-6,7 are added to the Bibliography. However ISO/IEC 29182-2 and ITU-T Y.2221 remain in normative references because this standard references ISO/IEC 29182-2 for terms and definition, and references ITU-T Y.2221 for terms and definition, and defining general requirements.
OG C1	2		ed	The references listed in this clause are not normative references as defined in the ISO/IEC Directives, Part 2, 6.2.2.	Move these references to the Bibliography.	**Partly accepted** See CA1.
US5	Page iv	Paragraph 5	ed	Use the correct name for WG 7.	Replace “Sensor Network” by “Sensor Networks”.	**Accepted**

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KR2	Introduction	1st paragraph	ge	What is the "global standards" exactly? From "Recently sensor network applications are being evolved by new technologies such as wireless sensor networking, context-based processing, global standards, open service environment, nationwide integration, etc."	Correct or define the definition of global standard.	**Resolved** It is vague to understand "global standards" as new technologies. "Global standards" is deleted.
US6	Page v	Part 2	ed	Extra word needs to be removed.	Remove the word "part" before "provides".	**Accepted**
US7	Page v	Part 3	ed	It's better not to have two occurrences of "e.g." in the same sentence.	Propose alternate text: "Part 3 presents the reference architecture from various viewpoints, such as business, operational, system, technical, functional, and logical.	
US8	Page v	Part 4	ed	Just some minor tweaks.	Propose alternate text" "Part 4 provides a description of models for various entities, such as systems, subsystems, and components with their interfaces, functional descriptions, and how they are used in the reference architecture and for implementation purposes."	**Accepted**
US9	Page v	Part 5	ed	Just some minor tweaks.	Propose alternate text for the first sentence: "Part 5 provides detailed information on the interfaces among various entities in the reference architecture."	**Accepted**
US 10	Page v	Part 7	ed	Just some minor tweaks. It's better not to have two occurrences of the word "interoperability".	Propose alternate text: "Part 7 provides design principles for the reference architecture that take the interoperability requirements into account."	**Accepted**
US 11	Page v	Last paragraph	ed	Just some minor tweaks.	Replace "the organization's own requirements for interoperability" with "any applicable interoperability requirements".	**Accepted**
US 12	1		ed	Missing preposition.	Insert the word "of" after "overview".	**Accepted**

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US 13	2	Line 1	ed	The word “application” may not be the best choice.	Suggest replacing it with “use”.	**Not accepted** The paragraph in normative reference is defined in ISO template.
US 14	4		ed	ICT stands for “Information and Communication Technologies”.	Make the appropriate change.	**Resolved** ICT: Information and Communication Technologies
US 16	Page 2-9		ed	The document is missing a lot of articles (a, an, the), too many to list in this document. Occasionally, there articles have been included, where they are not needed.	Suggest having the document read by a native speaker of the English language and the changes made in the MS Word version of this document with change tracking turned on.	**Accepted**
US 15	5	Paragraph 1	ed	Just some minor tweaks.	Suggest alternate text: “A sensor network is a system of spatially distributed sensor nodes interacting with each other and, depending on the application, with ICT infrastructures, in order to acquire, process, and provide information from/about the physical world and optionally react to such information.”	**Accepted**
KR3	5	2nd paragraph	te	Title of figure1 is “Overall architecture for sensor network” but in text it says” The overall architecture and a set of components involved in realizing various sensor network services are shown in Figure 1.”	Express exactly whether figure1 is architecture of sensor network or architecture of sensor network service.	**Resolved** The title of Figure 1 is changed to “Overall architecture for sensor network service”
LU7	5	2nd paragraph, 3rd line	ed	Typo	Change “Date” to “Data”.	**Accepted**

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LU9	5		ed	Ambiguous numbering.	Suggest using letters (a), (b) and (c) to enumerate the three interfaces, instead of repeating (1), (2) and (3).	**Accepted**
OG C2	5		te	The OGC Sensor Web Enablement initiative has developed several information and service model standards for integrating sensor networks into the Sensor Web, i.e. make sensor networks accessible to the “Rest of the World” via middleware services. Many successful applications have been and are being created using these standards. They should therefore be referenced in section 5 and listed in section 2. Alternatively, reference a summary document provided by the OGC.	List “OGC Sensor Web Enablement: Overview and High Level Architecture (OGC 07-165)” (http://portal.opengeospatial.org/files/?artifact_id=25562) in clause 2 and reference it in clause 5 – together with ITU-T F.744.	**Resolved** OGC 07-165 is added to Bibliography and referenced in clause 5.
US 17	5	Figure 1	te	The figure shows two separate sensor networks.	Suggest breaking the figure into two parts. Figure 1a should be the lower sensor network involving a few sensors and a user. Figure 1b would then depict the more complicated architecture. The text preceding the figure needs to be appropriately revised.	**Accepted** Figure 1 is divided into two parts and additional information is added.
US 18	5	Figure 1	te	Information processing in a sensor network can be done in a centralized or distributed manner. In the former case, there is a central node that receives information from all sensor nodes and processes that information to deduct high-level information about some phenomenon in the physical world. In the latter case, all sensor nodes are similar and act similarly in terms of processing the information they have acquired or obtained from neighboring nodes. They collectively deduct information about the physical world through possibly many rounds of information exchange. There is also a hierarchical case with clusters of sensor nodes that collaborate locally and exchange	Figure 1 needs more work to capture these possibilities. This particularly applies to the lower part of the figure, unless we assume the user and the central node are one and the same.	**Resolved** ISO/IEC 29182-1 describes general overview and requirement. For this reason, Figure 1 depicts overall architecture. Detailed architecture and the functionalities will be defined by other parts such as part 3,4 and 5.

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				information with other clusters through a cluster head in each cluster.		
CN1	5	Figure 1	te	As shown in Figure1, gateway can connect to access network and also connect to backbone network directly. Then in what kind of application scenarios will the gateway connect to backbone network and to access network? What is the difference between these two approaches?	Please clarify what access network and backbone network are, and technology in both of them respectively. Please describe the application scenarios where gateway directly connects to backbone.	**Resolved** The comment of a backbone network connection from a gateway without access networks was received in 2nd WG 7 meeting. However, it is rarely that a sensor network is connected to a backbone without access networks. Figure 1 is changed to reflect backbone network connections with access networks.
CN6	5	Figure1	te	It is not normal that user can communicate with single sensor node directly and a certain sensor node plays a role as sink. If so, this node must have high capability.	Suggest using gateway. On the one hand, gateway can aggregate sensed data into information required by users and manage SN. On the other hand, gateway can convert protocols when connecting to other heterogeneous sensor network.	**Resolved** It is agreed that this case is not normal. However, a user may have a mobile sensor node such as a PDA or a Smartphone which are capable of connecting to sensor networks. In this case, users can communicate with single sensor node and acts as a sink node.
US 19	Page 2	Paragraph 2, line 5 from bottom	te	It is not clear what is meant by “integrated services”	Explain the terminology and possibly include examples.	**Resolved** “integrated services” is changed to **“**data processing

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						(data integration, filtering and so on)."
US 20	5	Paragraph 2, last three lines	te	There is no need to list IT companies, etc.	Suggest alternate text: "However, in some cases sensor networks may not be connected to the "Rest of the World", which typically means the Internet or its future incarnations. In such cases, all services are provided inside the sensor network."	**Resolved** The paragraph is changed as following: However, in some cases sensor networks may not be connected to the "Rest of the world", where typically includes the Internet or its future incarnations, service providers, and end-users. In this case, all services are provided inside the sensor networks.
OG C3	5	1st paragraph	ed	The abbreviation "IT" is not spelled out anywhere in the standard.	Spell it out at its first use, or include it in the list of abbreviated terms.	**Resolved** See US20.
CN5	5	2nd paragraph and figure 1	ge	End-users belongs to "rest of the world", how about user?	As shown in Figure1, end-user means user who uses SN service indirectly, such as via service provider. User means who can connect to SN and use service directly. This is the only distinguish between them. Suggest that both of them belong to "Rest of the world".	**Resolved** There is no difference between user and end-user. Revised document uses "user" instead of "end-user".
LU8	5		ed	Typo	Change "Figure 2 illustrated" to "Figure 2 illustrates".	**Accepted**
US 21	5	Paragraph 3, Line 1	ed	Minor correction.	Replace "illustrated" by "illustrates".	**Accepted** See LU8

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US 22	5	Paragraph 3, Line 2	ed	Text needs to be consistent with Figure 2.	Replace “modules” by “module”.	**Accepted**
US 23	5	Paragraph 3, Line 4	ed	If the interface between the sensor network and the “Rest of the World” is through gateways, it makes sense to state that here.	Replace “Rest of the World” with “”Rest of the World” through gateway nodes”.	**Not accepted** See US17. If a sensor network is isolated from a backbone network, it may not necessary to deploy a gateway to connect a sensor network to the Rest of the world.
US 24	5	Paragraph 3, Line 5	ed	The word “node” needs to be pluralized.	Replace “node” by “nodes”.	**Accepted**
US 25	5	Figure 2	ed	The words “sensor” and “actuator” need to be pluralized.	Replace “Sensor/Actuator” with “Sensors/Actuators”.	**Accepted**
CN2	5	Figure 2	te	In figure 2, why sensor nodes are divided into three layers, and what is the relationship between three layers and the ISO seven layers reference architecture?	Please specify the source on sensor node architecture, and the relationship with the ISO seven layers reference architecture.	**Not accepted** The source of the Figure 2 is SGSN TD Ver 3.0 (WGSN-N0007). However, original figure was changed at 2nd WG 7 meeting through a discussion. Also, Figure 2 does not depict sensor node architecture from the protocol viewpoint such as OSI seven layers.
US 26	5	Last paragraph	ed	Various components of the node hardware have been described. The same needs to be done for “Service and basic node functions” and “Application Software Module”. It would also be good to be consistent in which words	Insert appropriate text to describe various components/functions of “Service and basic node functions” and “Application Software Module”.	**Resolved** ISO/IEC 29182-4 defines “service and basic functions” and “application software

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				need to be capitalized. The latter comment applies to the entire document.		module (ASM)".
OG C4	6		te	This clause seems to consist of random thoughts about sensor networks of the future. There is no apparent organizing principle.	Rearrange this discussion according to some organizing principles. There seem to be two. First, the view of sensor networks as an extension of the internet (6.5) implies a greater variety of users (6.4) who are concerned with many different applications (6.13). This, in turn, drives a need for application interworking (6.3), dynamic provisioning of service (6.2), data gathering and pre-processing (6.6), collaborative information processing (6.8), and location information. Finally, requirements for robustness, reliability, and maintainability (6.12) lead to the needs for Intra-network communication (6.9) dynamic network topology (6.11) and power efficiency and operating lifetime (6.10).	**Accepted** Clause 6 is re-arranged according to the proposal.
KR1	6		te	When new multiple correspondent users want to get the various type of information (for each user's own) that is directly provided by a sensor node which is already on work, a new request methods is needed for the sensor node which has more resource limitation than the conventional devices such as PC, PDA, Smartphone, etc., which have user interfaces for managing user requests.	The contents of following attachment should be added.	**Accepted**
LU2	6		te	A description concerning self-adaptive sensor networks may be added.	Suggest the following paragraph: "In self-adaptive sensor networks, the service and basic node functions in Fig.2 may self-adapt to accommodate changing conditions, and optimize resource management and the sensor node	**Resolved** Self-adaptation seems to be requirement rather than characteristic. Therefore, the proposal is added clause 7

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					function."	as following: 7.9 Self-adaptation For supporting robustness and reliability, sensor networks may self-adapt to accommodate changing conditions, and optimize resource management and the sensor node function.
US 27	6		te	There is some overlap between the topics covered in Section 6 and those covered in Section 7. It has to be decided whether this is OK or there should be a better distinction of what is a "characteristic" and what is a "general requirement".	This needs to be discussed at WG 7 meetings.	**To be discussed** The purpose of clause 6 is to define the characteristics of sensor network and clause 7 is to define the requirements for sensor networks based on clause 6. However it will be beneficial to check the overlap between clause 6 and 7 at the 3rd WG 7 meeting.
US 28	6.1		ed	The topic covered under 6.1 is not of the same nature as others covered under 6.2, 6.3, etc.	Correct the numbering system. Perhaps the "Overview" could be numbered 6.0. Another option is to remove the word "Overview" altogether and use the text as prelude to the numbered list that follows.	**Resolved** Clause 6.1 "Overview" is removed.
LU1	6.2		te	The description can be improved and extended with more information on sensor network as an infrastructure for dynamic service definition and execution integrating field data.	Suggest replacing the current text with the following: "Some sensor networks may have dynamic adaptation and/or self-adaptation characteristics.	**Accepted** Proposed text replaces the current text except the first paragraph and the whole sentences after the fourth

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					Sensor networks accommodate specific end-user requirements through communication and collaboration among their nodes (both sensor nodes and gateway nodes, when the sensor network is connected to the "Rest of the world"), which allows them acquiring, processing, transferring, and providing information from the physical world and optionally reacting. Those interactions (communications and collaborations) are driven by the individual embedded sensor node and gateway node programs. In some areas, like Ambient Intelligence and Self-Serve applications, end-users' service requirements and expectations may be diverse and dynamically changing. Sensor networks are incorporated in these applications as field information service infrastructure, which may be combined with other data sources like private enterprises with functions including data filtering, data mining, context-aware decision making, estimation and forecasting. As in the example below, some users may ask for weather information from the weather information services, but due to their different needs, they have different service requirements demanding the different levels of services: - Fishermen may request on-demand and periodic weather information for fishing; - Tourists may request periodic and warning/alarming information of the nature's condition for a few days, a week, or a month	bullet item because they look like requirement rather than characteristics. However, "Dynamic reprogramming" is added to clause 7 as following: 7.10 Dynamic reprogramming The goal of dynamic reprogramming consists in changing at runtime the rules that govern sensor network activities. All or only part of the nodes (sensor and gateway nodes) in a sensor network may be concerned by dynamic reprogramming. Dynamic reprogramming may be triggered manually or automatically. Typically, if the back-end network is related to a dynamic sensor network macro-programming environment or to an automated reasoning system. In these cases, the new program is computed and communicated via the back-end network. New sensor network programs may also be computed by sensor nodes themselves,

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					by a service subscription; - Crewmen of a ship may request long-term weather forecasting information; - National disaster centre may request the whole weather information to observe the natural phenomena of an area and detect emergency situations. The above may be “hard-coded” and provided as a predefined, although diverse, set of services. Or, the sensor network may serve as a platform for runtime definition of user-specific services by dynamic programming of the sensor network. The goal of dynamic reprogramming consists in changing at runtime the rules that govern sensor network activities. All or only part of the nodes (sensor and gateway nodes) in a sensor network may be concerned by dynamic reprogramming. Dynamic reprogramming may be triggered manually or automatically. Typically, if the back-end network is related to a dynamic sensor network macro-programming environment or to an automated reasoning system. In these cases, the new program is computed and communicated via the back-end network. New sensor network programs may also be computed by sensor nodes themselves, being provided by another sensor node (case of intra and inter-sensor network code mobility), or acquired directly from interacting end-users. This is in contrast with many of the traditional sensor networks (or sensors-on-the-network),	being provided by another sensor node (case of intra and inter-sensor network code mobility), or acquired directly from interacting end-users. This is in contrast with many of the traditional sensor networks (or sensors-on-the-network), installed for specific application purposes where consumer service models are not considered. The examples of those include structural monitoring, street light control, agricultural monitoring and management, military surveillance, city facility management, home utility control, and flood and fire monitoring.”

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					installed for specific application purposes where consumer service models are not considered. The examples of those include structures monitoring, street light control, agriculture monitoring and management, military surveillance, city facilities management, home utility control, and flood and fire monitoring."	
US 29	6.2	Lines 4-5	ed	Minor editorial change.	Replace "structures" , "agriculture", and "facilities" by "structural", "agricultural", and "facility", respectively.	**Accepted**
US 30	6.2		ed	Characterizing sensor networks as a means for improving the quality of life might be a narrow viewpoint. For example, sensor networks have certain military applications that have nothing to do with improving quality of life.	Sensor networks enable us to acquire information about the physical world and take actions to affect that world.	**Resolved** See LU1.
US 31	6.2	Line 7	ed	Minor editorial change.	Suggest alternate text: "Some examples of data sources include ….".	**Resolved** See LU1.
US 32	6.2	Line 10	ed	Minor editorial change.	Replace "type" by "types".	**Resolved** See LU1.
US 33	6.2		te	In the example given at the end of this subsection, there is no clear distinction between various cases.	Need to come up with a better example.	**Resolved** Current example intends to show the differences between four services which are based on the sensor networks that gather weather information. Each four service scenarios have different requirements. For

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						example, periodic weather information for fishermen is not needed for crewmen of a ship because long-term weather forecasting information is necessary for crewmen. This different service requirement may be satisfied in dynamic manner according to the types or purposes of the users. However, four examples can be enhanced at the 3rd WG 7 meeting if necessary and the meeting agrees.
LU 10	6.3		ed	Typo	Remove "the" in the following: "… may allow the a sensor network to be developed …"	**Accepted**
US 34	6.3		te	It is not clear what application inter-networking is.	Need to improve the text and provide examples that enhance clarity.	**Resolved** Application inter-working is rephrased.
US 35	6.4	Line 5	ed	Minor editorial change.	Replace "result in" by "develop". Also spell out B2B and B2C and include them in Section 4.	**Accepted** B2B and B2C are added to clause 4.
LU3	6.5		te	The description can be extended.	Suggest adding the following paragraph: "The emerging sensor networks may also be regarded as an extension of Internet towards the so-called Internet of Services, Users may regard the sensor network as a provider of sensing and actuating atomic services (in the sense of service-	**Resolved** The clause of "extension of internet" is rephrased as following: Wired/wireless sensor networks have to be

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					oriented computing), and use them to compose more sophisticated services (service orchestration). For example, an atomic sensing service could be "The current temperature of Jane's grandmother's home", and could be used to compose a service that checks periodically the home temperature, and if an alert level is reached, sends an email to Jane. In this case, Jane subscribes dynamically to her grandmother's home temperature service."	regarded as an extension of Internet towards the physical world ("Internet of Things") connecting physical world with users which cannot simply be regarded as a communication network. Sensors which never have been able to communicate with their environment start to process sensor data and produce information which is routed to a user. The "user" might be a man or machine. In most cases, the human user does not stand in the foreground. Sensor nodes detect and monitor environment conditions (i.e. "the physical world") and/or other physical beings. The raw data from the sensor's observation (includes detect & monitor) is then transformed into different formats of data and/or information by various types of processing. These data and information are routed to different users according to their requests.
CN7	6.5		ge	We shall not say that sensor network is extension/derivation of other networks. Sensor network is just sensor network; It has some relationship with Internet	Suggest that in this subclause, describe the relationship between SN and Internet and how SN	**Resolved** See LU3.

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				just because it uses Internet for remote data transfer. SN is a independent system.	transfers data via Internet. The subtitle should also be clarified.	
US 36	6.5		te	It is not clear what the last sentence means.	Need to find better ways of describing the distinction between emerging and traditional sensor networks. It is not even clear what the latter is.	**Resolved** See LU3.
US 37	6.6		te	Sensor networks need to be able to deal with unreliable communication links, particularly wireless ones. This is part of the nature of wireless transmissions. There has to be a distinction between wireless links connecting sensor nodes to each other and those connecting sensor nodes to gateways. While the latter are typically designed to be more robust and reliable, the former may not be robust and reliable. For example, consider sensors deployed or air-dropped in a large open field.	Revise the text according to the comments to the left.	**Resolved** Clause 6 explains the characteristics of sensor networks. Proposed text seems to be requirement rather than characteristic. The explanation of "data gathering and pre-processing" is rephrased as following: Usually, the main objective of a sensor network implementation is to gather and pre-process sensor data. For providing sensor network services, sensor nodes gather data from the physical world and pre-process data such as integration or filtering before transferring sensor data to back-end systems (in the case of backbone network connected),
US	6.7		te	Suggest alternate text to the right for sentence beginning	"In certain applications, the output data from	**Accepted**

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38				with “For certain”.	sensor nodes is considerably more useful if it is accompanied with the location information for where the data was acquired. In such cases, determination of the location, commonly referred to as localization, of the sensor nodes is one of the most important services that the sensor network would have to provide.”	Proposed text replaces current text. Also, last two sentences are move to clause 7.12 as following because providing location information to sensor nodes can be considered as requirement. 7.11 Location information support A sensor network may offer a service to provide the sensor node location information by a type of localization process, e.g., triangulation or data routing latencies. For certain cases, sensors or sensor nodes in a network have the ability to determine their own location, especially for mobile sensor nodes, e.g., on-board GPS receiver.
US 39	6.8		ed	Editorial change.	“The data from a sensor may have to be pre-processed and refined at the sensor node acquiring the data or at another sensor node. Depending on application, …”.	**Accepted**
US 40	6.9	Line 4	ed	Minor editorial change.	Remove the word “time”.	**Accepted**
US	6.9	The sentence	ed	Editorial change.	“Therefore, the routing scheme and communication protocols used by the sensor	**Accepted**

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41		before the last			network have to be designed with the throughput and latency required by the application taken into account. In certain cases, the design has to be sufficiently flexible to support a plethora of applications with different throughput and latency requirements."	
US 42	6.10		ed	Need to present a better story.	Suggest alternate text: "Energy efficiency is important in many sensor networks where the sensor nodes are battery-operated and it is desirable for the network to be operational for as long as possible. In certain short-lived networks, it is not possible to change the sensor node batteries and the network would stop functioning and essentially dies when a sufficiently large number of its nodes run out of battery power. There are many ways to reduce energy consumption in sensor nodes, including using low-power and hence low-speed processors, limiting the communication range and transmission bandwidth of the radios used in each sensor node, limiting the storage size, using efficient data processing algorithms, having sensors go into sleep mode according to some schedule, etc. It may also be possible to increase the battery power available to a sensor node through some means of energy harvesting. The operating lifetime of a sensor network is determined by the nodes consuming the largest amount of power relative to their battery sizes. The lifetime is hence maximized by redistributing the tasks that have to be done by the sensor	**Resolved** Clause 6.10 is mixed with characteristic and requirement. Current text of clause 6.10 is divided into two parts as following: 6.13 Energy efficiency and operating lifetime Energy efficiency is important in many sensor networks where the sensor nodes are battery-operated and it is desirable for the network to be operational for as long as possible. In certain short-lived networks, it is not possible to change the sensor node batteries and the network would stop functioning and essentially dies when a sufficiently large number of its nodes run out of battery power. 7.6 Power and energy management

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					network among its nodes in such a way that no node dies significantly earlier than the others, even if such redistribution results in an increased overall power consumed by the entire network."	The following sentences are added to clause 7.6 and clause 7.16 "Power efficiency" is removed for redundancy with clause 7.6 "There many ways to reduce energy consumption in sensor nodes, including using low-power and hence low-speed processors, limiting the communication range and transmission bandwidth of the radios used in each sensor node, limiting the storage size, using efficient data processing algorithms, having sensors go into sleep mode according to some schedule, etc. It may also be possible to increase the battery power available to a sensor node through some means of energy harvesting. The lifetime is hence maximized by redistributing the tasks that have to be done by the sensor network among its nodes in such a way that no node dies significantly earlier than the others, even if such redistribution results in an increased overall power

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						consumed by the entire network."
US 43	6.11	Line 1	ed	Minor editorial change.	Replace "sensory" by "sensor" to be consistent with the rest of the document.	**Accepted**
US 44	6.11	Line 7	ed	Minor editorial change.	Replace "networks' performance" by "network performance".	**Accepted**
CN3	6.11	The last 3 line from the bottom in the subsection	ed	The routing may be very fast. However communication protocols cannot be very fast.	Suggest alternate text: The routing and communication protocols may be flexible and changed very fast.	**Accepted**
CN4	6.12		ed	Robustness, reliability and maintainability, nothing more? How about adaptability, scalability and collaborability? The content needs to be consistent with subtitle. This subsection begins with a wireless sensor network, but end with sensor networks. They should be well matched.	The content should be improved. "A wireless sensor network" should be consistent to "sensor network".	**Resolved** The title of clause 6.10 is change to "Maintenance" and the text is rephrased as following: "A wireless sensor network may operate for a long period of time without maintenance. For wireless sensor network's operations, no operator is typically available to resolve any problem. Maintenance and problem solution capabilities may be restricted to remote maintenance and resolution operations."
US	6.13	Line 4	ed	Minor editorial change.	Delete "a".	**Accepted**

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45						
US 46	6.13	Line 5	ed	Minor editorial change.	Replace “users” by “user”.	**Accepted**
US 47	6.13	Line 7	ed	Minor editorial change.	Use the plural form for “sensor” and “explosive”.	**Accepted**
US 48	6.13	Lines 8-10	te	How does the application profile describe the benefit of the application? Through a word description or quantitatively?	The sentence needs to be expanded on.	**Resolved** The last sentence is removed.
CN8	7		ge	The order of subclauses can be improved.	Suggest ordering these subclauses by priority.	**Not accepted** Clause 7 does not prioritize the requirements for sensor networks. .
CA2	7		te	It is clear that the potential deployment of sensor networks will raise significant concerns by governments and members of the public related to privacy, security and safety. While technology may make it possible to easily deploy such ubiquitous sensor networks, it will be a challenge to ensure that they are only deployed in environments whose owners and occupants allow such deployment, and that they adequately address their application requirements throughout their lifetime. Sensor networks used in safety applications will need to meet significant functional safety requirements, and it is still not clear whether a “safety” sensor network could ever meet the availability, security and other performance requirements needed when the health of people and/or the environment is at stake.		**Resolved** The following sentence is added to the last of the current text of security and privacy section: “Also, the privacy of users and user information should be protected, for example the possibility of a violation of privacy by sensor networks should be informed to users and uses shall be able to decide the privacy policy.”

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				Sensor networks monitoring individuals, or even able to identify individuals, will clearly raise significant privacy issues in many countries. The current sections 7.9 and 7.11 begin a discussion of robustness, security and privacy requirements and we look forward to a fuller description of them.		
LU6	7		te	Code mobility may be a major requirement in some sensor networks.	Suggest adding the following subclause: "Code mobility support A sensor network may support code mobility to support features like dynamic reprogramming, dynamic reorganization, dynamic resource optimization, as well as to support the implementation of QoS, scalability, security, self-healing, and other quality attribute policies. Code may move within the same sensor network (intramobility) and to another sensor network (inter-mobility). Also, a sensor network shall accept the transition of a sensor node code from another sensor network. A sensor network may support dynamic reprogramming (through code mobility) to support dynamic adaptation to changes in user requirements. Dynamic reprogramming may concern all or part of sensor nodes. NOTE: In contrast with 7.5, in these applications sensor nodes are not necessarily mobile (although could be), but the sensor node code is mobile for optimization reasons, or to accommodate specific end-user needs."	**Accepted**

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US 49	7.1		ed	The topic covered under 7.1 is not of the same nature as others covered under 7.2, 6.3, etc.	Correct the numbering system. Perhaps the "Overview" could be numbered 6.0. Another option is to remove the word "Overview" altogether and use the text as prelude to the numbered list that follows.	**Resolved** Clause 7.1 Overview is removed.
US 50	7.1	Line 2	ed	Minor editorial change.	Use the plural form for "environment".	**Resolved** See US49.
US 51	7.1	Line 6	ed	Too many uses of the word "general".	Suggest replacing "general for all types of sensor applications," with "those that are common to all types of sensor applications".	**Resolved** See US49.
LU4	7.2	First paragraph	te	The paragraph can be extended.	Suggest extending the paragraph with the following: "The communication capability among sensor nodes themselves, sensor nodes and gateway nodes, and among gateway nodes themselves, may be used for communicating both data and program."	**Accepted**
OG C5	7.2	1st paragraph	te	The statement that a network "shall provide communications capabilities between individual sensor nodes" implies a direct connection between every pair of nodes. Is that really the intent? This seems excessively strict as a requirement.	Clarify the requirement.	**Resolved** See LU4.
US 52	7.2	Lines 2 and 4	ed	Minor editorial change.	Use the plural form of "network" and "communication".	**Resolved** See LU4. Also, "network" and "communication" become the plural form.
US 53	7.2	Line 5-6	ed	Minor editorial change.	Replace the sentence with "The communication range can vary from short to long depending on	**Accepted**

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					the communication protocol used, situation and application."	
OG C6	7.3	1st paragraph	te	This sentence contradicts much of the discussion in Clause 6 by implying that a sensor network has a single application.	Delete "for its prospective application" from the sentence.	**Accepted**
US 54	7.4		te	The application may rely on several different types of networks but does not consist of them.	Suggested alternate text: "A sensor network may be heterogeneous in the sense that it may be comprised of several different, inter-connected, interoperable networks. Note: A sensor network application may rely on different subnetworks of a heterogeneous sensor network. Standards for interconnection and interoperability of such subnetworks have to be developed."	**Accepted**
LU5	7.5		te	The title can be made more explicit.	Suggest changing the title with the following: "Sensor node mobility support"	**Accepted**
US 55	7.5		te, ed	It is debatable whether sensors should be allowed to join a network they were not intended for. This poses a lot of security concerns. Aside from the above point, the text can be improved.	The issue of migration of a sensor node from one network to another needs to be discussed at WG 7 meetings. Aside from the above point, the following alternate text is suggested: "A sensor network with mobile sensor nodes shall support node mobility within the network and from one network to another. Also, a sensor network shall accept the migration of a sensor node from another network." The "Note" can stay unchanged.	**Accepted** Suggestion is accepted except "shall". "Shall" is changed to "may".

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CN9	7.5		te	Not all of SN can provide or need mobility support.	Replace “shall” with “should” in entire paragraph.	**Resolved** See US55.
US 56	7.6		te	Wouldn’t “Environmental Monitoring” be a more appropriate term? It’s more commonly used than “Observation of the environment”.	This needs to be discussed at WG 7 meetings.	**To be discussed** The title of clause is changed to the suggestion and this will be discussed at the 3rd WG 7 meeting.
OG C7	7.6		ed	This subclause provides no useful information.	Delete it.	**To be discussed** See US56.
US 57	7.7	Line 4	ed	Need to be consistent with terminology used earlier in the document.	Replace “operation life time” with “operating lifetime”.	**Accepted**
US 58	7.8		ed	A better example can be provided, or one can leave it in general terms.	Spell out QoS and include it in Section 4. Suggested alternate text for 3rd sentence: “For example, detection and notification of fire in certain locations, e.g. a hospital nursery, is time-critical and needs to be done reliably and with low latency.” The “NOTE” at the end of the subsection is now redundant.	**Accepted**
US 59	7.9		te	There is a need to distinguish between “reliability”, “robustness”, “resilience”, and “fault-tolerance”.	This needs to be discussed at WG 7 meetings. The “NOTE” at the end should be removed altogether.	**To be discussed** The “NOTE” is removed.
US 60	7.10		te	The description needs to be expanded.	Suggest adding the following text at the end: “There are many ways in which a network can be scalable, including but not limited to the following:	**Accepted**

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					number of nodes, per area density of nodes, volume of data traffic that needs to be communicated, mobility, and multiplicity/frequency of events under surveillance."	
US 61	7.11	Last sentence	te	There are other aspects of security that deserve documenting here.	Suggested alternate text: "….., such as malicious acts to disrupt the operation of the sensor network, protection against ….".	**Accepted**
OG C8	7.12	1st paragraph	ed	The abbreviation "IP" is not spelled out anywhere in this standard.	Spell it out at its first use, or include it in the list of abbreviated terms.	**Resolved** IP is added to the list of abbreviated terms.
US 62	7.13		te	It is not clear what is meant by "identification" in the last sentence.	The sentence needs to be expanded upon.	**Resolved** The last sentence is deleted.
US 63	7.17		ed	The "NOTE" at the end of this subsection needs to be removed altogether.	Delete "NOTE: ….".	**Not accepted** ITU-T Y.2221 uses the term "USN" instead of "sensor network". However, ISO/IEC 29182-1 uses the term "sensor network" instead of "USN". Therefore, this NOTE should be kept.
US 64	7.18		ed	The text can be improved.	Suggested alternate text: "As sensor networks are generally deployed as stub networks, i.e. networks that have no knowledge of other networks and send their nonlocal traffic to other networks through a few known paths , IDs for sensor nodes in the network may be allocated by a coordinator in the sensor	**To be discussed** This clause comes from ITU-T Y.2221 which is pre-published. It is not certain that this document can change the text of Y.2221.

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					network considering the application and service types. Alternatively, the nodes could have IP-like global addresses along with special naming mechanisms for the network services. USN applications ….". It is necessary to describe what "temp_etri_x36y30" and the other sensor ID mean, even though they may look obvious to the editors of this document. The second bullet is exactly the same as the first one and hence should be removed. The "NOTE" is not consistent with the preceding text.	However, for better understanding this clause is rephrased as following: "As sensor networks are generally deployed as stub networks, i.e. networks that have no knowledge of other networks and send their nonlocal traffic to other networks through a few known paths, IDs for sensor nodes in the network may be allocated by a coordinator in the sensor network considering the application and service types. Alternatively, the nodes could have IP-like global addresses along with special naming mechanisms for the network services. USN applications and services have following ID design requirements: - In some applications and services, data-aware ID or naming mechanism is recommended. (e.g. temp_x36y30 for temperature data at the sensor node x36y30, wind_x36y30 for wind

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						data at the sensor node x36y30) Application functions should support to decode the ID with local or global addresses of the sensor nodes. - In some applications and services, geographical ID or naming mechanism is recommended. (e.g. lat36.13n_long127.59e for the location of the 36.13 degrees of north latitude and 127.59 degrees of east longitude) Application functions should support to decode the ID with local or global addresses of the sensor nodes.
US 65	7.19		ed	Editorial changes.	Replace “networks. E.g. bootstrapping and Neighbor” with “networks. For example, bootstrapping and neighbor”. Suggested alternate text for first bullet: “Control messages in sensor networks are required to be secure and should not be perceived as a burden or overhead even in low-power sensor networks.”	**To be discussed** Same reason with US64. See US64.

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					Once again, the "NOTE" should be removed altogether.	
US 66	7.20		ed	It is preferable to remove "Lightweight" from the title of this subsection but emphasize the fact that routing protocols used in sensor networks are sometimes required to be lightweight.	Can "Lightweight" be removed from the title, or does it come from the ITU-T document? Suggested alternate text for first sentence: "As sensor networks may have special requirements on energy efficiency and data-oriented communications, the following requirements may have to be placed on the routing protocol used by the network:" The references to "USN applications" after bullet 1 and before the last bullet need to be removed in light of the notes in many previous subsections. MP2P, P2MP, and P2P need to be spelled out and included in Section 4. Finally, the "NOTE" at the end of this subsection needs to be removed altogether.	**To be discussed** Same reason with US64. See US64. MP2P, P2MP, and P2P are added to the list of abbreviated terms.
OG C9	7.17 – 7.20	NOTES	ed	It is not good standards practice to use two different terms for the same concept.	Select either "USN applications and services" or "sensor network applications and service" as the term to be used throughout the document.	**To be discussed**
OG C10	7.17 – 7.20	NOTES	ed	The text of the NOTE at the end of each of these subclauses is confusing since the term has been change only in these subclauses and not "in this International Standard."	Delete "in this International Standard" from each NOTE.	**Accepted**

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