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SERIES Y: GLOBAL INFORMATION
INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS
AND NEXT-GENERATION NETWORKS

Next Generation Networks – Service aspects: Service
capabilities and service architecture

Sensor control networks and related applications in a next generation network environment

Recommendation ITU-T Y.2222

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GENERATION NETWORKS**

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Recommendation ITU-T Y.2222

Sensor control networks and related applications in a next generation network environment

Summary

Recommendation ITU-T Y.2222 provides an introduction to sensor control networks (SCNs) and related applications in a next generation network (NGN) environment. More specifically, it provides an overview of SCNs, configurations for SCN applications and service requirements of SCN applications for support in a NGN environment.

History

Edition	Recommendation	Approval	Study Group
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Actuator, configurations for SCN applications, decision-making process, emergency management, gate, mote, NGN, SCN, SCN applications, SCN controller, sensor control networks, sensor networks, verification application.

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.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

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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In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

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Recommendation ITU-T Y.2222

Sensor control networks and related applications in a next generation network environment

1 Scope

This Recommendation provides an introduction to sensor control networks (SCNs) and related applications in a next generation network (NGN) environment. More specifically, this Recommendation provides:

- definitions of SCN and SCN related terms;
- overview of SCNs;
- description of possible configurations for SCN applications and the decision-making process for these configurations;
- service requirements of SCN applications for support in NGN environment.

Moreover, two important use cases of SCNs are described in the appendices: SCNs for verification and SCNs for emergency management.

Business models and charging issues are outside of the scope of this Recommendation.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [ITU-T Y.2020] Recommendation ITU-T Y.2020 (2011), *Open service environment functional architecture for next generation networks*.
- [ITU-T Y.2061] Recommendation ITU-T Y.2061 (2012), *Requirements for the support of machine-oriented communication applications in the next generation network environment*.
- [ITU-T Y.2234] Recommendation ITU-T Y.2234 (2008), *Open service environment capabilities for NGN*.
- [ITU-T Y.2240] Recommendation ITU-T Y.2240 (2011), *Requirements and capabilities for next generation network service integration and delivery environment*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 actuator [ITU-T Y.2061]: A device performing physical actions caused by an input signal.

NOTE 1 – As examples, an actuator might act on the flow of a gas or liquid, on electricity distribution, or through a mechanical operation. Dimmers and relays are examples of actuators. The decision to activate the actuator may come from an MOC application, a human or MOC devices and gateways.

NOTE 2 (added by ITU-T Y.2222) – There are three types of actuators: information actuators, which are intended to provide visual, audio, sensory interaction with the human user; gateway actuators, which are intended to forward control commands given by SCN to other networks; machine actuators, which are electromechanical devices intended for physical interaction with the external environment.

3.1.2 application [b-ITU-T Y.101]: A structured set of capabilities, which provide value-added functionality supported by one or more services.

3.1.3 context awareness [b-ITU-T Y.2201]: A capability to determine or influence a next action in telecommunication or process by referring to the status of relevant entities, which form a coherent environment as a context.

3.1.4 machine oriented communication (MOC) [ITU-T Y.2061]: A form of data communication between two or more entities in which at least one entity does not necessarily require human interaction or intervention in the communication process.

3.1.5 next generation network (NGN) [b-ITU-T Y.2001]: A packet-based network able to provide telecommunication¹ services and able to make use of multiple broadband, QoS-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

3.1.6 NGN service integration and delivery environment (NGN-SIDE) [ITU-T Y.2240]: An open environment in NGN integrating resources from different domains and delivering integrated services to applications over NGN.

NOTE – These domains include, but are not limited to, telecommunication domain (e.g., fixed and mobile networks), Internet domain, broadcasting domain and content provider domain.

3.1.7 nomadism [b-ITU-T Q.1706]: The ability of the user to change their network access point on moving. When changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no service continuity or hand-over used. It is assumed that normal usage pattern is that users shut down their service session before attaching to a different access point.

3.1.8 open service environment capabilities [ITU-T Y.2234]: Capabilities provided by open service environment to enable enhanced and flexible service creation and provisioning based on the use of standards interfaces.

3.1.9 seamless handover [b-ITU-T Q.1706]: It is a special case of mobility with service continuity since it preserves the ability to provide services without any impact on their service level agreements to a moving object during and after movement.

3.1.10 sensed data [b-ITU-T F.744]: Data sensed by a sensor that is attached to a specific sensor node.

3.1.11 sensor [b-ITU-T Y.2221]: An electronic device that senses a physical condition or chemical compound and delivers an electronic signal proportional to the observed characteristic.

3.1.12 service [b-ITU-T Y.101]: A structure set of capabilities intended to support applications.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 aggregate value: A value calculated by combining the sensed data of several spatially distributed nodes, reference values and other data and intended to represent the environmental conditions of a given geographical area.

3.2.2 central communication channel: A communication channel or a set of communication channels for transmitting data between SCN controllers and actuators without utilizing nodes.

3.2.3 gate: Intermediate device that is used to provide a communication channel between an actuator and one or several nearby motes.

3.2.4 mote: A miniature computing device equipped with sensors and signal transceivers operating in a given radio band, and used for transmitting sensed data.

NOTE 1 – It is a kind of sensor node and it is characterized by a mandatory minimal level of computing resources.

NOTE 2 – Depending on application, a mote has one or more of the following capabilities: data manipulation, intelligent commutation and connectivity with actuators, retrieving data on the read-outs of near-site sensors.

3.2.5 mote group: A set of motes connected to each other without making usage of external networks.

3.2.6 non-SCN-enabled actuator: An actuator that is not able to communicate with motes directly, and uses networks to communicate with motes.

NOTE – In this Recommendation, a non-SCN-enabled actuator uses NGN to communicate with motes.

3.2.7 reference value: A value calculated by combining the sensed data of one or several closely situated motes and intended to represent the environmental conditions of some specific location.

3.2.8 sensor control network (SCN): A sensor network consisting of motes which is intended for controlling one or more actuators.

3.2.9 SCN application: An application that uses SCNs for controlling actuators.

3.2.10 SCN controller: A hardware/software system designed to collect and process data from motes and to transmit to actuators the necessary information for their control.

3.2.11 SCN-enabled actuator: An actuator that is able to communicate with motes directly.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

3G	Third Generation
GPRS	General Packet Radio Service
MOC	Machine Oriented Communication
NGN	Next Generation Network
NGN-SIDE	NGN Service Integration and Delivery Environment
OSE	Open Service Environment
PDA	Personal Digital Assistant
QoS	Quality of Service
SCN	Sensor Control Network
Wi-Fi	Wireless Fidelity
WiMAX	Worldwide Interoperability for Microwave Access

5 Conventions

In this Recommendation:

The keywords "is required to" indicate a requirement which must be strictly followed and from which no deviation is permitted if conformance to this document is to be claimed.