Introduction of IEEE SCC41 and IEEE 1900 series standardizations and coexistence scenarios for TVWS

Authors:

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Name	Company	Address	Phone	email
Hiroshi Harada	NICT	3-4, Hikarino-oka, Yokosuka, Kanagawa, Japan, 239-0847		harada@nict.go.jp
Stanislav Filin	NICT	3-4, Hikarino-oka, Yokosuka, Kanagawa, Japan, 239-0847		sfilin@nict.go.jp

Summary

- **Introduce the IEEE SCC41 and IEEE 1900 series standardizations**
- **Describe three 1900.4 deployment scenarios illustrating 1900.4 mechanisms that can be used for coexistence of dissimilar wireless networks in white space (WS)**

Overview of IEEE SCC41

IEEE Standards Coordinating Committee 41 Dynamic Spectrum Access Networks

Scope

This Standards Coordinating Committee will develop standards related to *dynamic spectrum access networks*. The focus is on improved use of spectrum. New techniques and methods of dynamic spectrum access require managing interference, coordination of wireless technologies and include network management and information sharing.

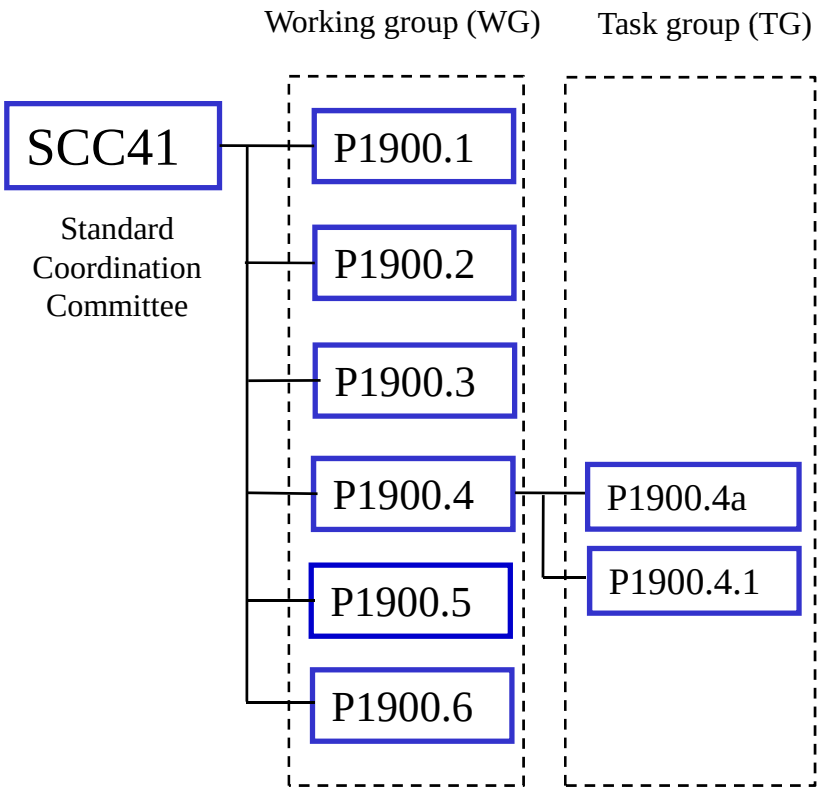
History

- The **IEEE 1900** Standards Committee was established in the **first quarter of 2005** jointly by the IEEE Communications Society and the IEEE Electromagnetic Compatibility Society
- The objective of this effort is to develop supporting standards dealing with new technologies and techniques being developed for next generation radio and advanced spectrum management
- **On March 22, 200**7 the IEEE Standards Board approved the reorganization of the IEEE 1900 effort as SCC 41 **on Dynamic Spectrum Access Networks (DySPAN)**

Chair	Hiroshi Harada (NICT)
Vice Chair	Klaus Nolte (Alkatel-Lucent)
Secretary	Bernie Eydt (BAH)
Treasurer	Oliver Holland (King's College London)

SCC41 Working Groups

- **IEEE 1900.1**: Standard Definitions and Concepts for Spectrum Management and Advanced Radio System Technologies
- **IEEE 1900.2**: Recommended Practice for Interference and Coexistence Analysis
- **IEEE 1900.3**: Standard for Assessing the Spectrum Access Behavior of Radio Systems Employing Dynamic Spectrum Access Methods
- **IEEE 1900.4**: Standard for Architectural building blocks enabling network-device distributed decision making for optimized radio resource usage in heterogeneous wireless access networks
- **IEEE 1900.5**: Standard on Policy Language and Policy Architectures for Managing Cognitive Radio for Dynamic Spectrum Access Applications
- **IEEE 1900.6**: Standard on interfaces and data structures for exchanging spectrum sensing information for dynamic spectrum access systems



IEEE 1900.4

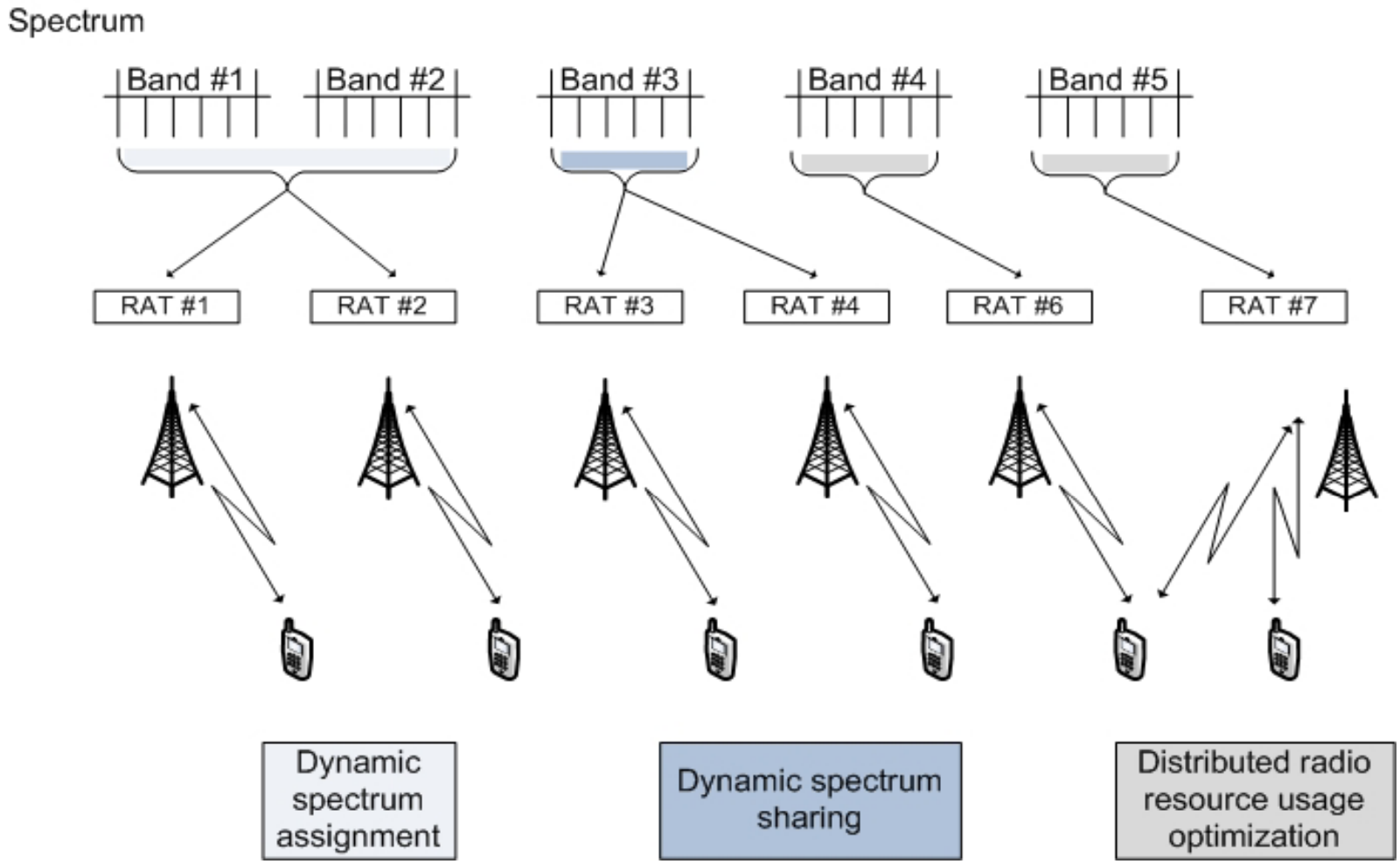
- **Scope**

  The standard defines the building blocks comprising (i) network resource managers, (ii) device resource managers, and (iii) the information to be exchanged between the building blocks, for enabling coordinated network-device distributed decision making that will aid in the optimization of radio resource usage, including spectrum access control, in heterogeneous wireless access networks. The standard is limited to the architectural and functional definitions at a first stage. The corresponding protocols definition related to the information exchange will be addressed at a later stage.

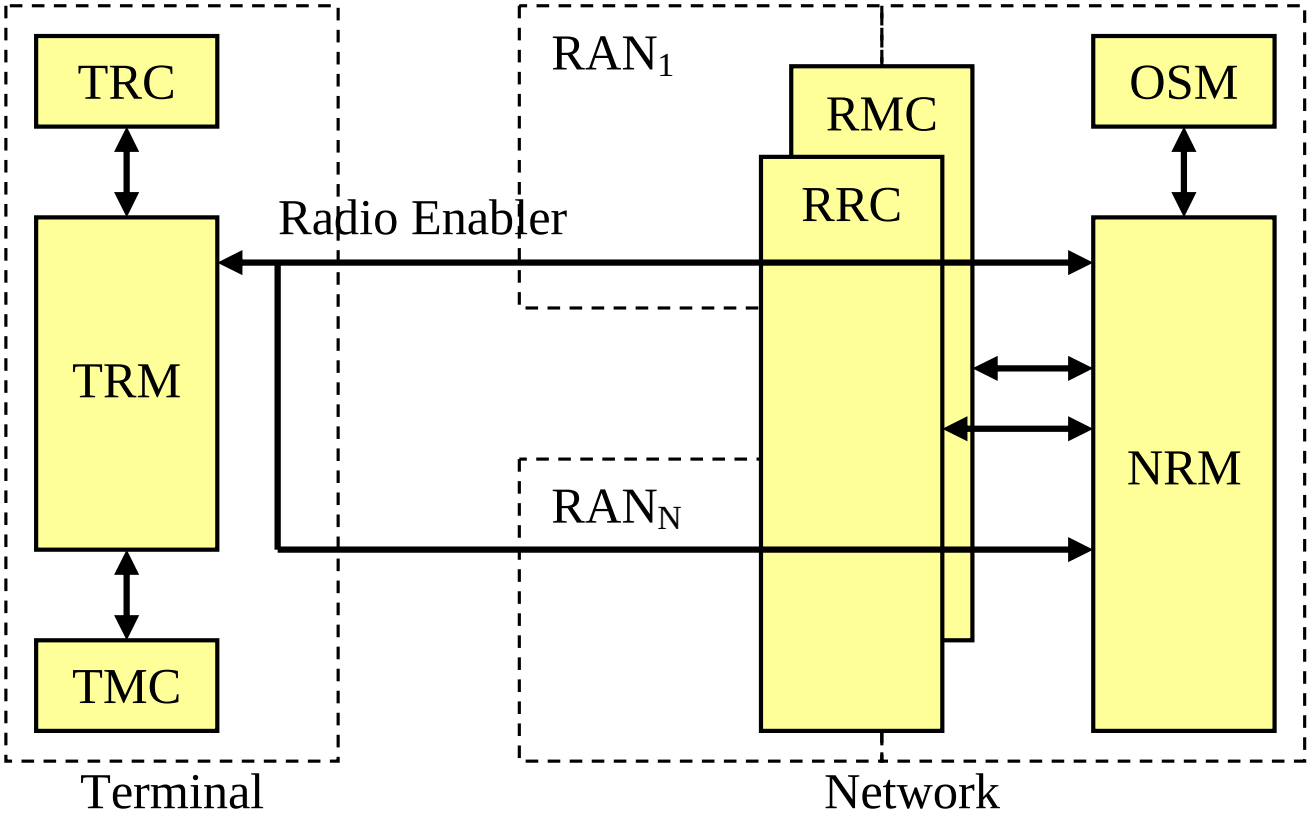
- **Purpose**

  The purpose is to improve overall composite capacity and quality of service of wireless systems in a multiple Radio Access Technologies (RATs) environment, by defining an appropriate system architecture and protocols that will facilitate the optimization of radio resource usage, in particular, by exploiting information exchanged between network and mobile Terminals, whether or not they support multiple simultaneous links and dynamic spectrum access.

IEEE 1900.4 Use cases

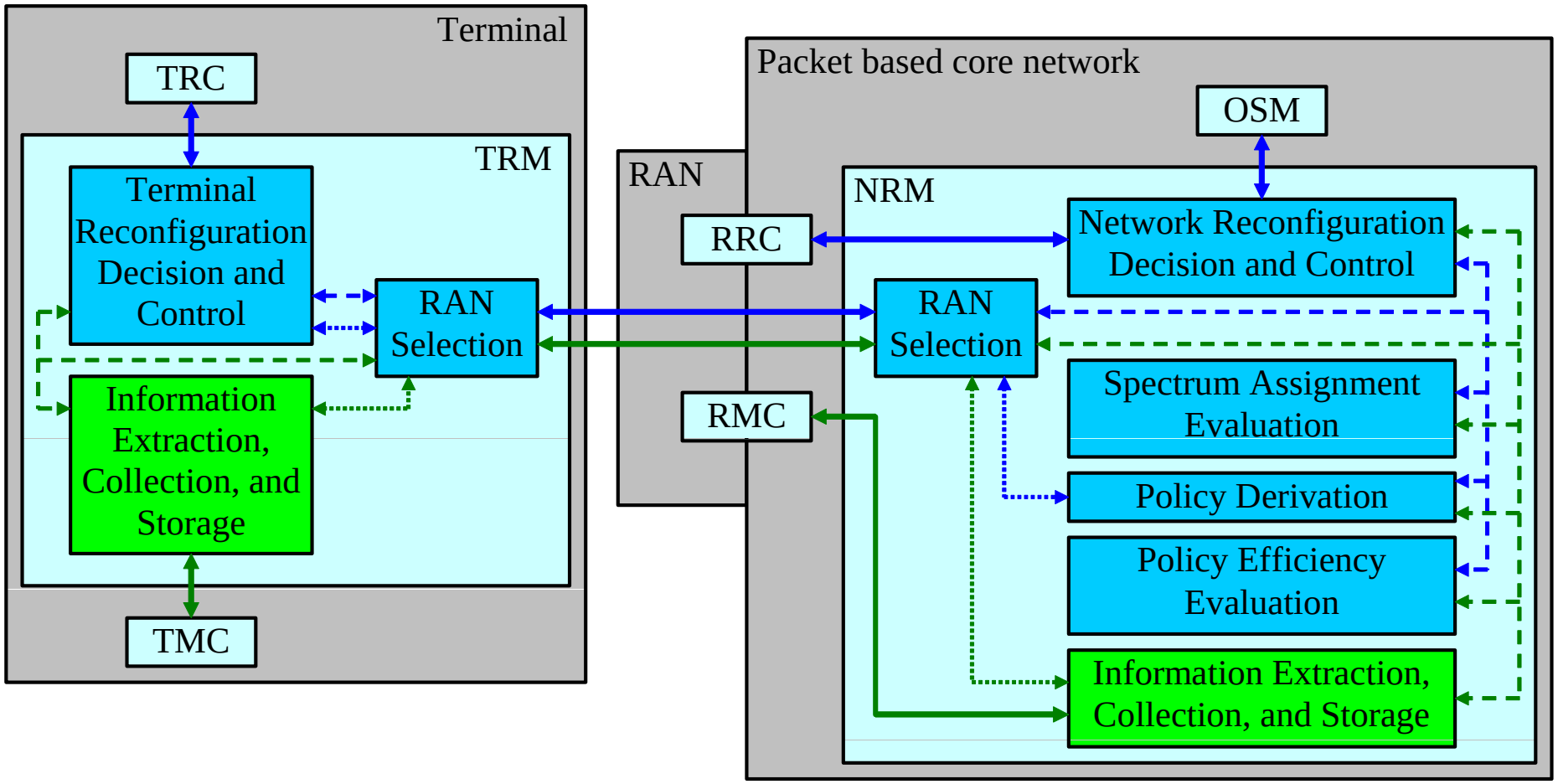


IEEE 1900.4 System Architecture



TRM – Terminal Reconfiguration Manager
TRC – Terminal Reconfiguration Controller
TMC – Terminal Measurement Collector
OSM – Operator Spectrum Manager
NRM – Network Reconfiguration Manager
RRC – RAN Reconfiguration Controller
RMC – RAN Measurement Collector
RAN – Radio Access Network configuration

IEEE 1900.4 Functional Architecture



IEEE 1900.5

- **Scope**
  - This standard defines a set of policy languages, and their relation to policy architectures, for managing the functionality and behavior of cognitive radios for dynamic spectrum access applications in a vendor-independent fashion.
- **Purpose**
  - The purpose of this standard is to define a policy language (or a set of policy languages or dialects), and their relation to policy architectures, for specifying interoperable, vendor-independent control of Cognitive Radio functionality and behavior for Dynamic Spectrum Access resources and services. This standard will also define policy language, architecture, and their relation with each other with respect to the needs of at least the following constituencies: the regulator, the operator, and the network equipment manufacturer.

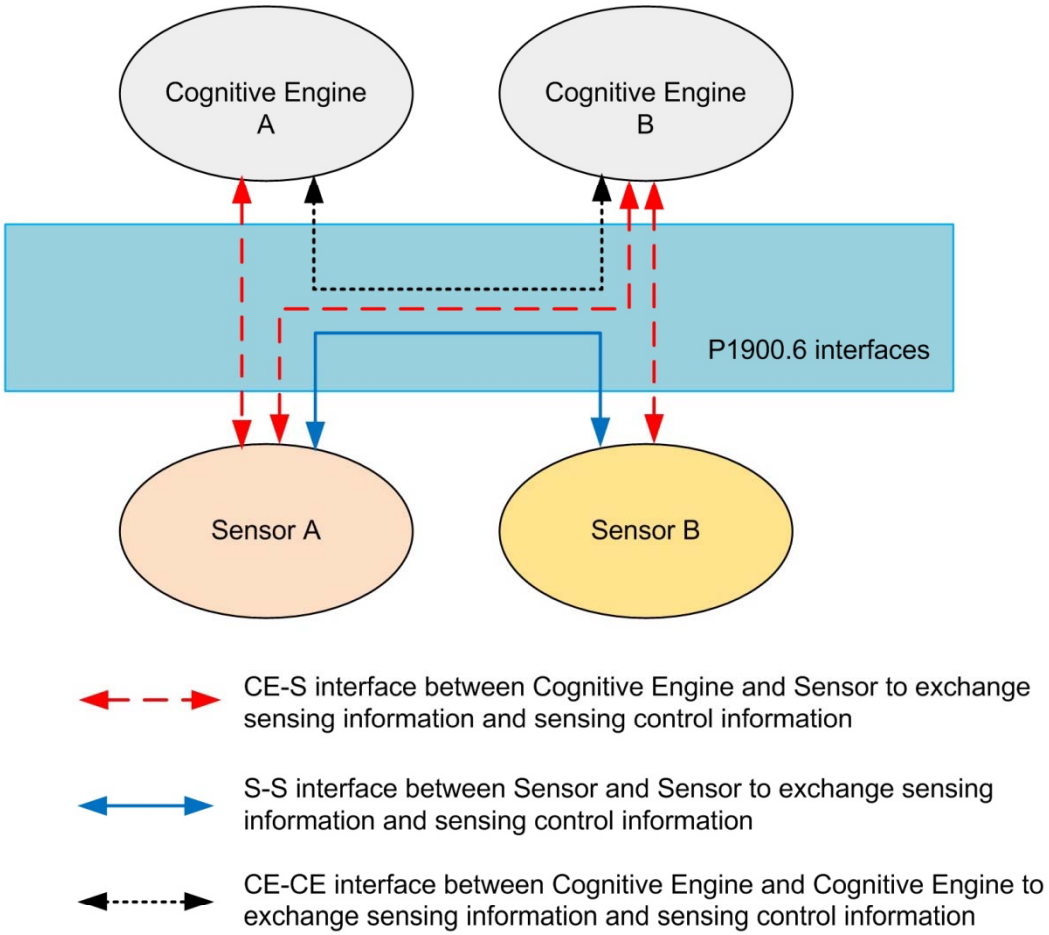
IEEE 1900.6

- **Scope**
  - This standard defines the information exchange between spectrum sensors and their clients in radio communication systems.
  - The logical interface and supporting data structures used for information exchange are defined abstractly without constraining the sensing technology, client design, or data link between sensor and client.
- **Purpose**
  - The purpose of this standard is to make development and evolution of spectrum sensors independent of the development and evolution of other system functions.

Interfaces in P1900.6

- Standardization topics
  The standard will provide a formal definition of data structures and interfaces for exchange of sensing related information between sensors and users of sensing information (client/cognitive engines)

- Current status
  - Three System Engineering Document (SEDs) on Objectives, Use Cases and State of the Art has been edited
  - SEDs set the system boundaries and link to the currently conceivable deployment scenarios
  - To develop the requirements, the use cases will be analysed together with objectives and the current state of the art in sensing technologies.



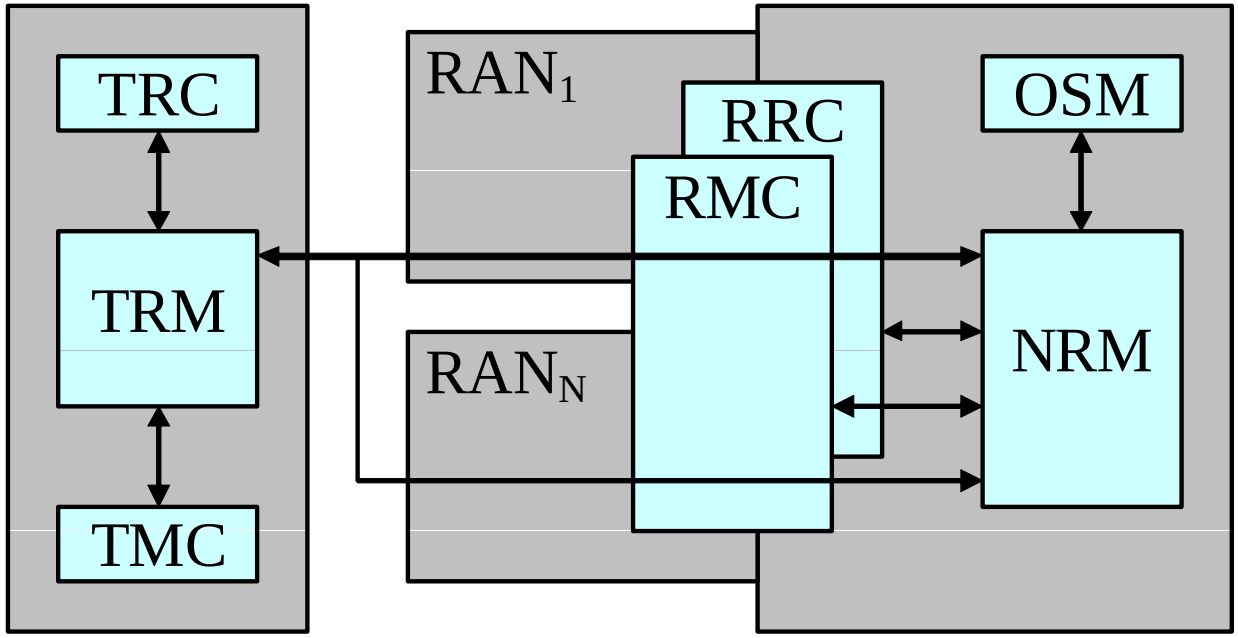
IEEE 1900.4 for Coexistence

Abstract

This contribution describes three 1900.4 deployment scenarios illustrating 1900.4 mechanisms that can be used for coexistence of dissimilar wireless networks in white space (WS)

More mechanisms for WS coexistence are currently under consideration in P1900.4.1 and P1900.4a

Background on IEEE 1900.4



RAN – radio access network
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RMC – RAN Measurement Collector
TRM – Terminal Reconfiguration Manager
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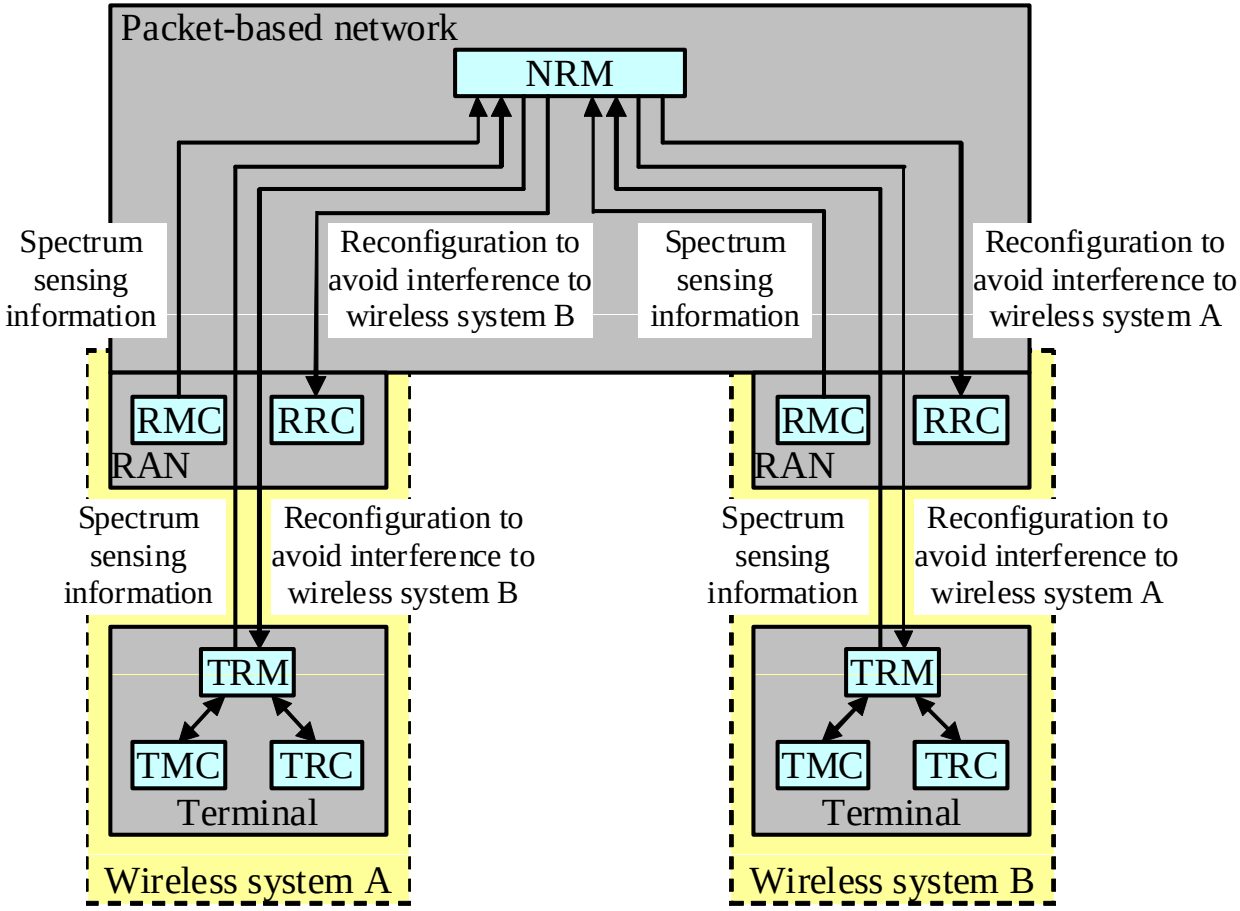
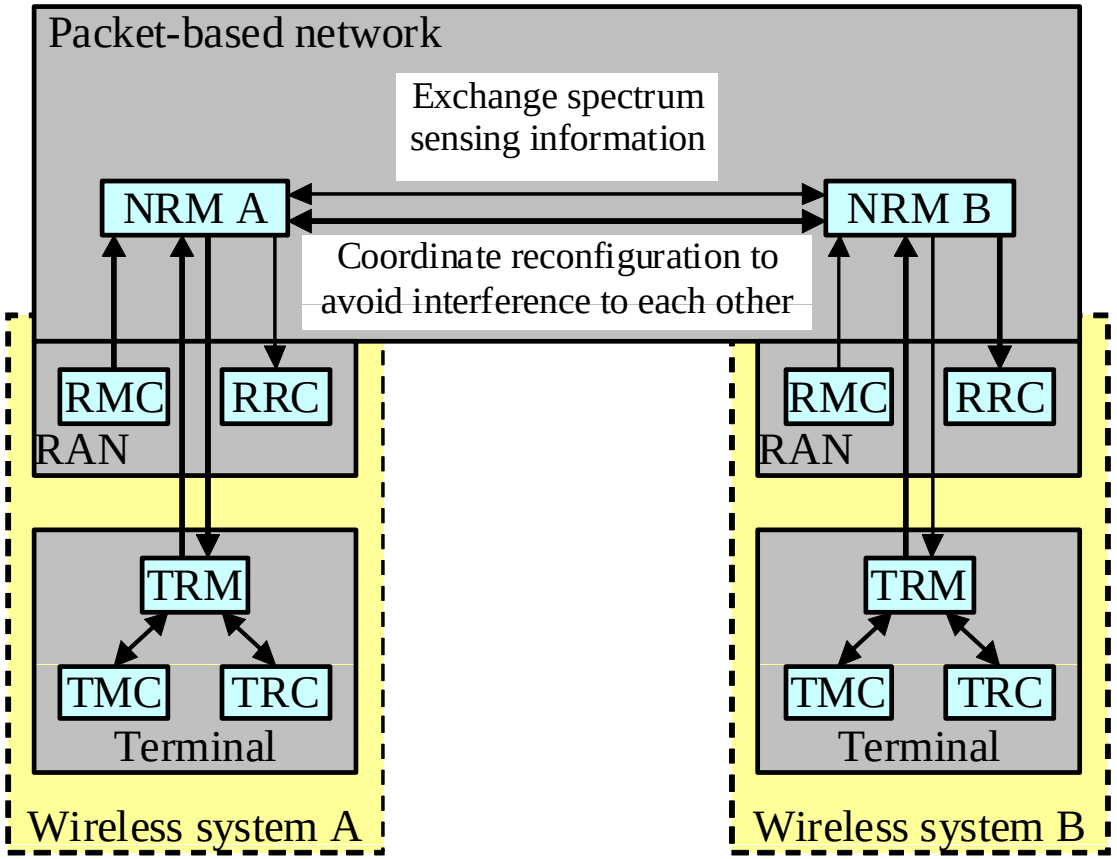
OSM – Operator Spectrum Manager
RRC – RAN Reconfiguration Controller
TRC – Terminal Reconfiguration Controller

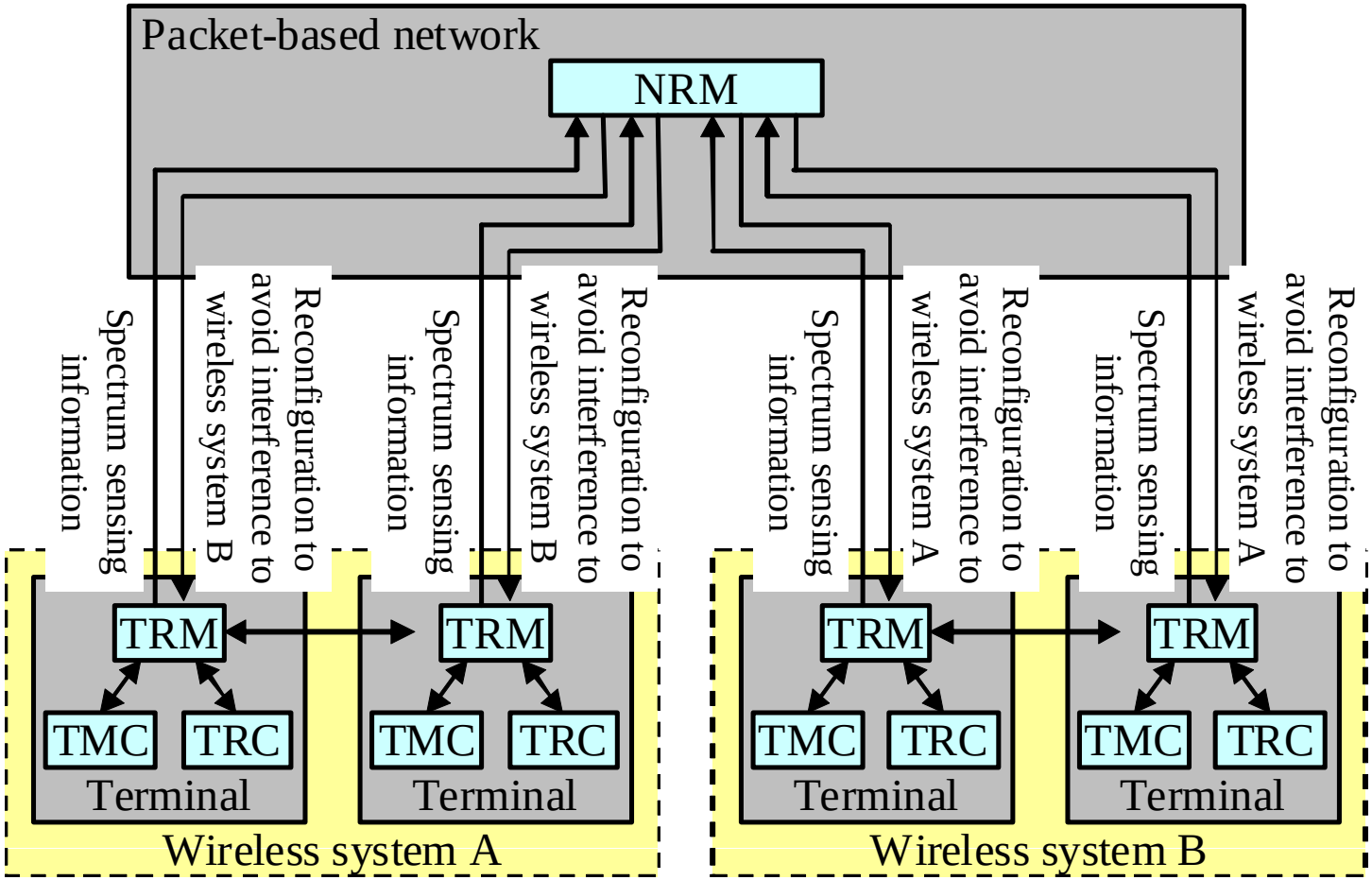
Coexistence scenario 1: dissimilar WS networks are managed by one operator



Coexistence scenario 2: dissimilar WS networks are managed by different operators



Coexistence scenario 3: ad-hoc WS networks



Acknowledgement

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