Considerations on P802.19.1 Architecture

Date: 2010-01-16

Authors:

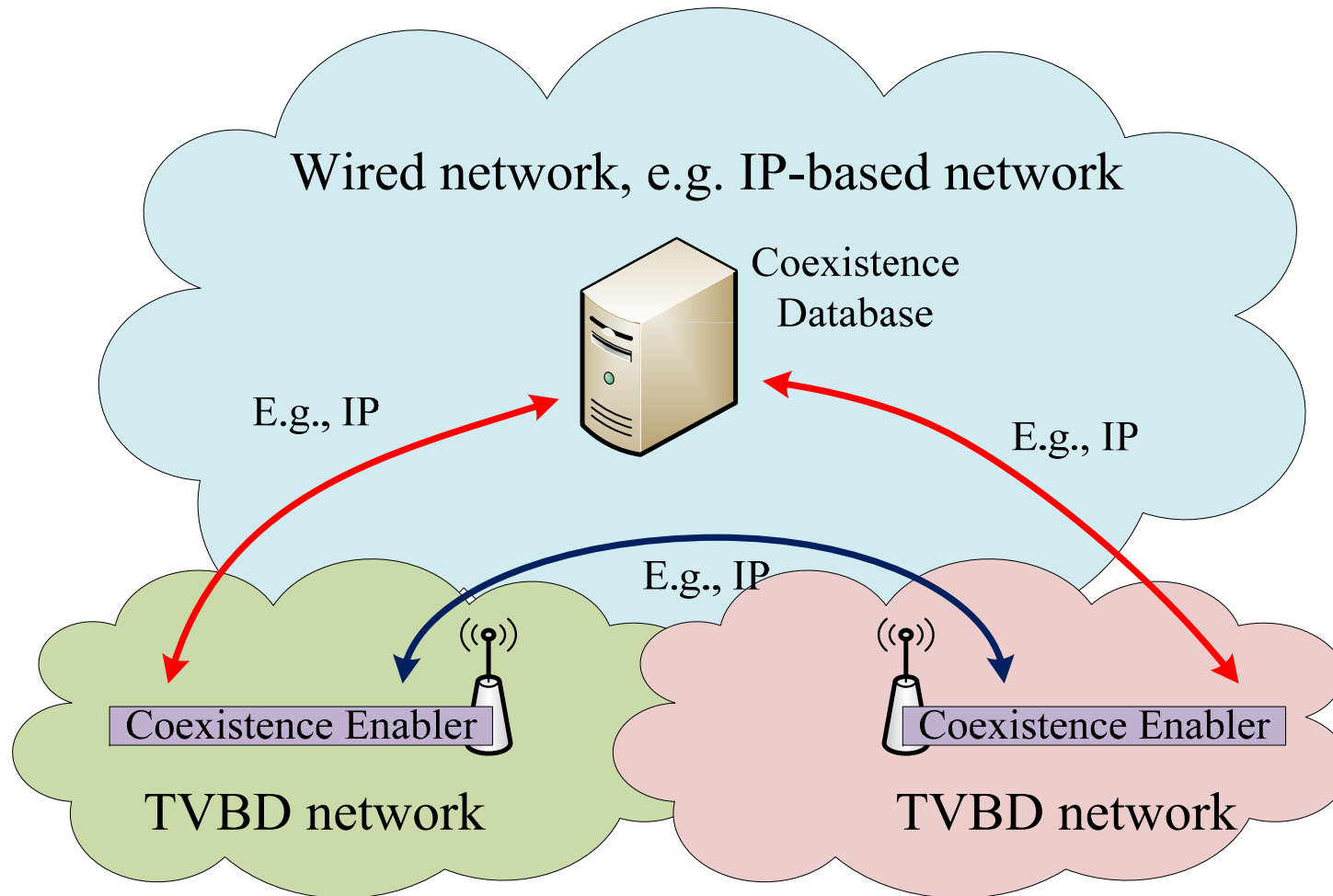| Name	Company	Address	Phone	email
Stanislav Filin	NICT	3-4 Hikarino-oka, Yokosuka, Japan	+81-90-6485-8930	sfilin@nict.go.jp
Tuncer Baykas	NICT	3-4 Hikarino-oka, Yokosuka, Japan		tbaykas@nict.go.jp
Hiroshi Harada	NICT	3-4 Hikarino-oka, Yokosuka, Japan		harada@nict.go.jp
Azizur Rahman	NICT	3-4 Hikarino-oka, Yokosuka, Japan		aziz@nict.go.jp
Chen Sun	NICT	3-4 Hikarino-oka, Yokosuka, Japan		sun@nict.go.jp
Yohannes Alemseged	NICT	3-4 Hikarino-oka, Yokosuka, Japan		yohannes@nict.go.jp
Zhou Lan	NICT	3-4 Hikarino-oka, Yokosuka, Japan		lan@nict.go.jp
Ha Nguyen Tran	NICT	3-4 Hikarino-oka, Yokosuka, Japan		haguen@nict.go.jp
Gabriel Villardi	NICT	3-4 Hikarino-oka, Yokosuka, Japan		gpvillardi@nict.go.jp
Chin Sean Sum	NICT	3-4 Hikarino-oka, Yokosuka, Japan		sum@nict.go.jp
Junyi Wang	NICT	3-4 Hikarino-oka, Yokosuka, Japan		junyi.wang@nict.go.jp
Chunyi Song	NICT	3-4 Hikarino-oka, Yokosuka, Japan		songe@nict.go.jp
Chang Woo Pyo	NICT	3-4 Hikarino-oka, Yokosuka, Japan		cwpyo@nict.go.jp

Abstract

This contribution proposes some architectural options for P802.19.1

Background

- **P802.19.1 system shall support the following functionality**

  – Discovery of P802.19.1-compliant TVBD networks

  – Obtaining and exchanging information required to make TVWS coexistence decisions

  – Centralized and distributed decision making for TVWS coexistence

  – Reconfiguration commands to implement TVWS coexistence decisions

Deployment option 1:
Distributed decision making 1/4

Wired network, e.g. IP-based network

Coexistence
Database

E.g., IP

E.g., IP

E.g., IP

Coexistence Enabler

Coexistence Enabler

TVBD network

TVBD network

Deployment option 1: Distributed decision making 2/4

- **Coexistence Enablers of different TVBD networks register in Coexistence Database**

- **Coexistence Enablers request registration information of other TVBD networks from Coexistence Database**
    - Coexistence Database may indicate new registration to already registered Coexistence Enablers

- **Using the registration information, Coexistence Enablers of co-located TVBD networks establish connection with each other**
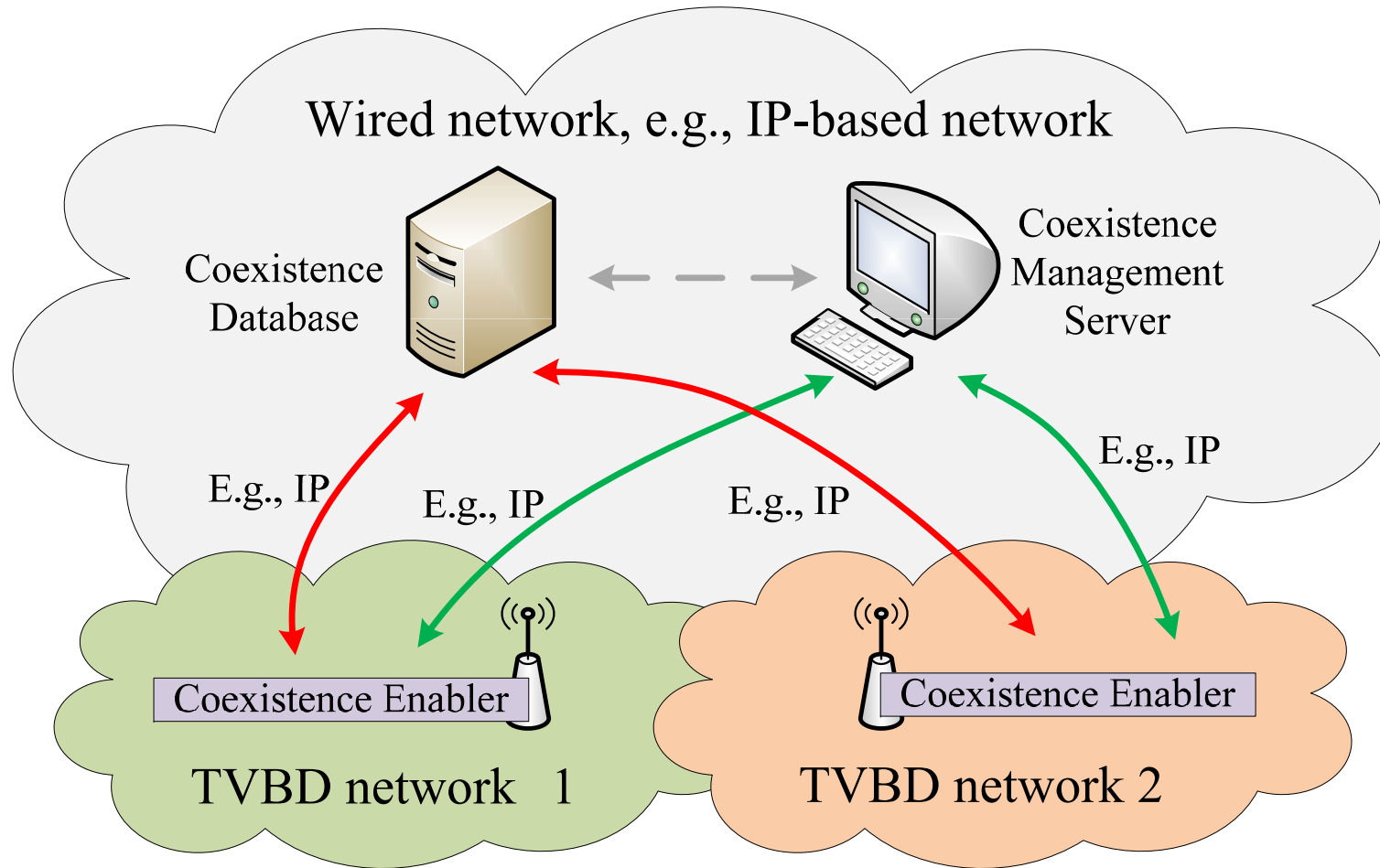
Deployment option 1:
Distributed decision making 3/4

- **Coexistence Enablers exchange information required for TVWS coexistence, for example**
  - TVBD network location
  - TV channels currently used by this TVBD network
  - Number of TV channels required for this TVBD network
  - Spectrum sensing results
  - Spectrum sharing capabilities (e.g. whether this TVBD network can share the same channel with other network or not and corresponding protocol, power control capability, etc.)

- **Also, Coexistence Enablers are aware of the available TV channels, e.g. by communicating with TVWS DB**

Deployment option 1:
Distributed decision making 4/4

- **Coexistence Enablers analyze received information and decide alternatives of TVWS usage**

- **Coexistence Enablers negotiate acceptable configuration of TVBD networks by exchanging TVWS coexistence protocol messages**

- **Once acceptable configuration has been found, Coexistence Enablers implement such configuration in their TVBD networks**

Deployment option 2:
Centralized decision making 1/3

Deployment option 2: Centralized decision making 2/3

- **Coexistence Enablers of different TVBD networks register in Coexistence Database**

- **Coexistence Enablers provide information required for TVWS coexistence to Coexistence Database**

- **Coexistence Management Server can obtain this information from Coexistence Database**

- **Coexistence Management Server is aware of available TV channels, e.g. by communicating with TVWS DB, e.g. via Coexistence Database**

Deployment option 2: Centralized decision making 3/3

- **Coexistence Management Server analyzes available information, decides TVWS usage, and generates corresponding reconfiguration guidelines**

- **Coexistence Management Server provides reconfiguration guidelines to Coexistence Enablers**

- **Coexistence Enablers make coexistence decisions within the received guidelines and implement these decisions by reconfiguring their TVBD networks**

Acknowledgement

- *This research was conducted under a contract of R&D for radio resource enhancement, organized by the Ministry of Internal Affairs and Communications, Japan.*