

Cognitive Service Provision



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The Future internet service provision landscape

- **Outline**

- Types of Services

- Future Internet Evolution

- Key characteristics of the Future Internet

- Future Internet Service Provision

- Service Provision essentials within the Future Internet ecosystem

- Example: ontology based Service representation and selection



Types of Services

- **Network Service Provision**
 - network connectivity (to a given type of RAT)
- **Application Service Provision**
 - includes multimedia services, games, etc.



Future Internet Evolution

- **Integration of heterogeneous and mobile networks – Mobile Internet.**
- **Power/bandwidth efficiency.**
- **Variety of service delivery modes (uni-, multi- and broadcast).**
- **No more one person-one device but more likely one person-many devices and device-to-device communications.**
- **Cross layer (spectrum, network) operation.**
- **Autonomic concepts: self-organisation, network self-management and QoS management.**



Future Internet Evolution

- **Services networking; multi-modal services; flexible billings.**
- **New architecture with self-management capabilities supporting multi-domain and be wireless-friendly (i.e. to be energy and spectral efficient and be capable of supporting a variety of wireless networks, from very low power sensor networks to wide area mobile networks).**
- **Introduction of cognitive capabilities in Future Internet elements.**



Future Internet service provision

- **The Future Internet environment should support services differently than today:**
 - the service provisioning itself is expected to be transformed
 - service delivery will be knowledge based
 - services will be proactive, open and ubiquitous
 - service-networks will be formed.
- **Complexity will grow**
 - Service plurality will lead to new requirements on control and management of services provisioning.
 - Conflicts are likely to emerge between new ways of service provisioning and the existing limitations of the current IP networking environment.
- **Vision: overcome limitations and allow for management of new levels of complexity.**



Future Internet service provision

- Adoption of a general service framework, allowing the increase of the freedom degree in service offerings as well as the efficient management of complexity.
- Future service provisioning solutions will be based on personal aware communications and user behaviour patterns.
- New discovery mechanisms, personalization, guidelines on “how to use” and a recognizable party that is responsible for overall customer care.
- Optimized service- layer solution to the ubiquitous, mobile service-enabled communications.
- Embed cognition in service provision and enable knowledge based service delivery.



Example: Ontology-based Service Representation and Selection

- **Definition of profiles**

- Service
- User
- Terminal
- Network

- **Example (Service):**

- MMS
- Text
- Picture
- Audio
- Video

The screenshot displays an ontology editor interface. On the left, the 'SUBCLASS RELATIONSHIP' pane shows a tree view of classes under the project 'NetworkProfile'. The 'NamedService' class is expanded, showing its subclasses: AudioDownloading, AudioStreamingService, BrowsingService, Email, InstantMessaging, Java_Portals, LiveTV, MMS (highlighted), MultimediaStreamingService, PhoneCall, RadioService, SMS, StillImage, VideoCalls, VideoConference, VideoDownloading, and VideoStreamingService. On the right, the 'CLASS EDITOR' pane is open for the 'MMS' class. It shows the class name 'MMS' and a text area for 'rdfs:comment'. Below this, the 'Asserted Conditions' section lists several logical constraints, including 'NamedService' and several 'exists' constraints involving subclasses like 'AMRAudioFormat', 'MP3AudioFormat', 'MPEG4VideoFormat', 'GIFImageService', 'JPEGImageService', and 'TextService'. The interface includes tabs for 'OWLClasses', 'Properties', 'Forms', 'Individuals', and 'Metadata' at the top.



Example: Ontology-based Service Representation and Selection

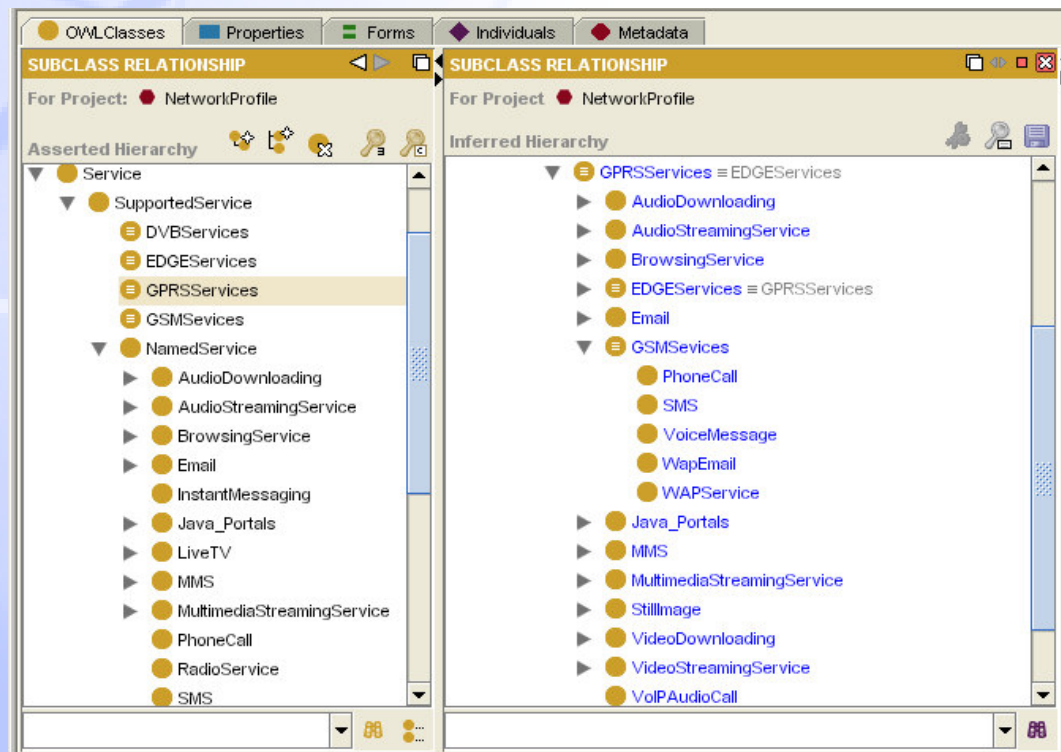
- Example (cont.):
- GPRS Services
 - Text
 - Picture
 - Audio
 - Video

The screenshot displays an ontology editor interface. On the left, the 'SUBCLASS RELATIONSHIP' pane shows an 'Asserted Hierarchy' for the project 'NetworkProfile'. The hierarchy is as follows: Service (parent) contains SupportedService (child) and NamedService (child). SupportedService contains DVBServices, EDGEServices, GPRSServices (highlighted), and GSMSevices. NamedService contains AudioDownloading, AudioStreamingService, BrowsingService, Email, InstantMessaging, Java_Portals, LiveTV, MMS, MultimediaStreamingService, PhoneCall, RadioService, and SMS. On the right, the 'CLASS EDITOR' pane is for the class 'GPRSServices'. It shows the 'Name' field with 'GPRSServices' and an 'rdfs:comment' field. Below, the 'Asserted Conditions' section shows two conditions: 'SupportedService' (NECESSARY & SUFFICIENT) and '(∃ consistsOfNonStreamingService (TextService ⊔ AMRSpeechService ⊔ NonStreamingService))' (NECESSARY). The interface includes tabs for OWLClasses, Properties, Forms, Individuals, and Metadata, and a status bar at the bottom with 'Logic View' and 'Pr...' options.



Example: Ontology-based Service Representation and Selection

- Example (cont.)
- Reasoning:
 - GPRS Services include MMS → When connected to GPRS, user can use MMS
 - GPRS Services include GSM Services → GSM Services are a subset of GPRS Services



Thank you

