An Ontology for Generic Wireless Authentication Data

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Outline

- Introduction to the GSM Network
- Restructuring of the Wireless Telecommunication Networks
- GSM, UMTS, WLAN Authentication
- Overview of our Ontology
- Future data integration
- Conclusions
The GSM Network

- Each area owns the main GSM subscriber database (HLR)
- Subscriber data is distributed all over a network (country)
- Services/applications have to be deployed for each area
Problems of Wireless Telecom Providers

- Distributed subscriber profiles
- Distributed applications and data
- No complete subscriber profile
- Various local applications (e.g. billing, CRM) for one user
- Closed mobile networks (difficult integration of Third Party applications)
- Vendor dependent network nodes
- Long installation/deployment time for new services
  → Complex and diverse networks
Advantages of a restructured network

- Integration of all access networks (domains) of the operator
- Re-usage of data and services for different access networks
- Access for the complete subscriber profile
- Reduced network complexity
- Simple support of seamless services
- Faster service access and deployment
- Reduced maintenance costs
Protégé OWL for Data Modelling

- No 3GPP data model definition
- Semantic Description of data
  - Network and area/location dedication (e.g. network nodes, algorithms)
  - XML-based standard for semantic applications
  - Common user data (meta-data)
  - Separation of domain and operational knowledge (e.g. extension of GSM services)
  - Analysis and re-use of domain knowledge
  - Formal description of service features and the overall concept
- Better expressiveness compared to concrete data models (e.g. relational, UML/OO, XML-Schema)
- Implementation independent description of data
- Logical description and reasoning of data
Our Concentration

- Different types of data stored in the NGPR
- Service and application specific data
- Our concentration: Authentication specific data

![Diagram showing authentication specific data in different domains: GSM Domain, UMTS Domain, WLAN Domain]
GSM Authentication

- Challenge/Response Authentication
- IMSI as proof of identity
- Challenge to calculate response
- Network and user side response
- Same response = successful authentication
Authentication in Other Networks

- **GSM**: Only user is authenticated
- **UMTS**: Similar to GSM Authentication, but
  - Different keys and algorithms used
  - Mutual Authentication
- **WLAN**: Authentication methods not standardized.
  - Password and Certificate based methods
Classes and Subclasses
GSM and UMTS Classes
Future Work

- Addition of other domains and services
Conclusions

- Novel approach of a common authentication model for a NGPR
- Semantic model offers data translation to concrete models
- Easier view compared to relational data models
- Rich standard which provides a better vocabulary for data modelling
  - describing properties and classes
  - relations between classes
  - cardinality
  - characteristics of properties and enumerated classes
Thanks for your attention,
Questions?