symbIoTe

Symbiosis of smart objects across IoT environments

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symbIoTe in a Nutshell

• an interoperability framework across IoT platforms enabling cooperation
  – offers an abstraction layer for a “unified view” on various platforms and their resources
  – provides unified and trusted discovery and secure access to physical and virtualized sensing/actuating IoT resources
  – offers flexible integration of smart space infrastructure within symbIoTe-enabled environments and device roaming in visited platforms
  – allows stakeholders to overcome market barriers and assure optimal collaboration and cooperation on top of the available often fallow resources
Vision & Objectives

- Interoperability of IoT platforms for rapid cross-platform application development
- Hierarchical, adaptive and dynamic IoT environments
- Security, access scopes and identity management
- Realistic cross-platform deployments
- Open source and commercialization
Architectural Sketch

Existing platform-specific applications

symbIoTe-enabled domain-specific applications

Extended platform-specific applications

Discovery
Management
Optimisation

symbIoTe high-level APIs

Application Domain

Cloud Domain

IoT Platform 1

symbIoTe Interworking API

symbIoTe Interworking API

IoT Platform 2

Smart Space Domain

Platform-specific Gateway

symbIoTe Middleware

symbIoTe Middleware

Platform-specific Gateway

Device Domain

IoT Gateway

Computing and Storage

IEEE 802.15.4/ZigBee, 6LoWPAN

CoAP

HTTP

MQTT

symbIoTe Client

QoS, Security, Privacy, Trading/Bartering of resources
Layered approach: 4 domains motivated by the oneM2M architecture

• Application Domain
  – high-level API for managing virtual IoT environments
  – offers domain-specific enablers to ease the development of domain-specific applications

• Cloud Domain
  – interworking interface for the exchange of information between two collaborating IoT platforms

• Smart Space Domain
  – standardized API for resource discovery and configuration; enables device roaming

• Device Domain
  – heterogeneous devices capable of dynamically blending with the surrounding environment

• Cross-domain: security and privacy, QoS issues, resource trading and bartering
The symbIoTe Stack

Level 1: lightweight symbIoTe
Level 2: platform federations
Level 3: adaptive symbIoTe smart spaces
Level 4: full symbIoTe stack with roaming things
Use Cases

• Smart Residence
  – demonstrate cross-IoT domain services in the Smart Home/Office

• Smart Yachting
  – automate the information processes between megayachts and mainland

• Smart Mobility and Ecological Urban Routing
  – integration of environmental with mobility data for green route calculation

• EduCampus
  – Federated cross-IoT domain Campus services

• Smart Stadium
  – Indoor location services for stadium visitors support
Stakeholders & Benefits

- Innovative **business models**; incrementally deployable
- Application developers are able to use physical resources across platforms in a uniform way
- **IoT platform providers** can increase the number of users through multitude on innovative applications being built on top.
- Infrastructure providers gain competitive advantage due to dynamically configurable symbIoTe-enabled smart spaces.
- **SMEs** are symbIoTe’s primary target group!
## Open Calls

<table>
<thead>
<tr>
<th>Call Type</th>
<th>Topic/Thematic area</th>
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<tbody>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Open Call</td>
<td>Development of <strong>Level 1 symbIoTe compliant IoT platforms</strong> (Application Domain)</td>
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<tr>
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<td>Development of <strong>Level 2 symbIoTe compliant IoT platforms</strong> (Cloud Domain)</td>
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<tr>
<td>2&lt;sup&gt;nd&lt;/sup&gt; Open Call</td>
<td>Development of <strong>Level 3-4 symbIoTe compliant IoT platforms</strong> (Smart Space and Device Domains)</td>
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<td>Development of <strong>applications that benefit from the symbIoTe compliant platforms</strong></td>
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<td><strong>Deployment of symbIoTe middleware in real environment and conduction of small-scale trials</strong></td>
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<td>Contest</td>
<td>Offline ‘hackathon’-style challenge on <strong>specific functionality for Level 4 symbIoTe compliant platforms</strong> (Device Domain)</td>
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Thank you!

Questions?

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