Research Group IBCT
UGent - IBBT - INTEC
Piet Demeester

City Services
Advanced home and

IBBT
Outline

- Scenario
- Personalize your connectivity
- Personalize your services
- Stay always connected
Scenario in a home, office or city

- User with a single device
- User carrying multiple devices
- User with multiple devices at different locations (home, office, carrying with him, ...)
- User community formation
- User interaction with his environment
- User and user communities receiving personalized services
- ...

IBBT
Some basic building blocks

- Personalize your connectivity:
  - Virtual Private Ad Hoc (VPAN) network for user or community based connectivity
- Personalize your services:
  - Context framework for context gathering (sensors, repository, reasoning, API, ...)
- Stay always connected:
  - Supporting network technologies for connectivity support
Outline

- Scenario
- Personalize your connectivity
- Personalize your services
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Network Evolution

4G: evolution towards a "network of networks," integrating different technologies

- Fixed: higher bandwidth, lower cost, VoIP...
- Cellular: 1.5 billion subscribers, migration to UMTS (3G)
- Satellite: successful for broadcasting
- WLAN/WPAN/WBAN: lower cost, higher efficiency, different radio technologies, mobility
- Ad hoc and Mesh Networks: infrastructureless, self-organizing

Some characteristics: IP-based, broadband, mobility support, heterogeneity...
Consequences - observations

- Connectivity anywhere, at anytime and from any device
- Bigger and bigger
  - In terms of the user base
  - In terms of the number of devices
  - In terms of the number of available service and data
  - In terms of the number of available networks
Consequences - observations

- Bigger is better?
  - User will be overwhelmed
  - What, when and how to choose?
  - More security risks
  - Current focus: (maintaining) connectivity
  - How to manage all this?

- What are the user’s communication needs?
  - Communication often takes place within a limited context or scope
    - Work related communication: projects, customers, students...
    - Personal communication: friends, family, hobbies, games...
  - And thus involves only a limited subset of devices
    - A dynamic, mobile and distributed subset

- This aspect of communication is not reflected in current heterogeneous communication networks...
VPAN concept

- Network virtualization:
  - 4G all-IP network = carrier that provides end-to-end connectivity
  - On top: multiple virtual networks that logically structure the network and its services into small secure communities

- Ad hoc
  - Formed when needed according to user needs and context
  - Self-organizing and self-maintaining
  - Dealing with distributed, mobile and dynamic characteristics

= VPAN (Virtual Private Ad Hoc Network)

- Definition:
  - A secure and self-organizing virtual overlay network of distributed nodes
  - Deploying ad hoc network techniques and private addressing to enable connectivity
  - Secure: both in terms of networking and applications and services
VPAN – network view

Communication is confined within secure environment provided by the overlay
we need VPAN's

Stressful situations

VPAN: Why?
Authentication, unicast and broadcast session keys, MAC-IP binding

End result:
1. Pn IP(Ip)
2. Dynamic encryption, gateway interfaces

End result:
3. Hides heterogeneity of interfaces, management of multiple interfaces (only 1)

Universal convergence layer:

Establishment of secure communication link

Upon discovery of neighboring personal device

VLAN Concepts: Neighbor discovery
VPAN Concepts: Intra-Cluster Routing

Intra-cluster ad-hoc routing protocol

New links and link breaks are reported to proactive

After neighbour discovery:

VPAN cluster = self-organizing and self-maintaining overlay using private addressing and ad hoc routing
VPAN = self-organizing and self-maintaining overlay using proactive route establishment of overlay connectivity with remote clusters using dynamic tunneling and ad hoc routing.

VPAN Concepts: PN formation

End result:
- Also: deregistration, tunnel break management, mobility...
VPAN in a city environment
Stay always connected

Personalize your services

Personalize your connectivity

Scenario

Outline
Context Reasong

Aggregation of context information in knowledge

Processing of context information

Temperature, activity, company, mood, ...

But many more context parameters (time, weather, ...

Location is an important context parameter

Screen size, processing power, ...

Specific characteristics (bandwidth, battery lifetime, phone, wireless, ID tag, PDA, mobile handset, ...

Everybody has personal device(s) (portable, IP

Gathering of context information

Context Awareness Framework
Other sensors (proximity, temperature, …)
- RFID, WLAN, … location sensors
Other examples:

Client Sensor Components

Feed

Sensor Layer

DB Layer (Persistence)

Context Gathering Layer

Context Framework Layer

Example: Wired location determination software running in each user network on a connected PC

Software architecture
Role Based Access Control (RBAC)

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<tr>
<td>Time</td>
<td>Properties</td>
<td>User/Group</td>
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</table>

DB Layer (Persistence)

Sensor Layer

Context Framework Layer

Policy & Security

Application Components

External Components

Security and Policies using AOP + XACML

Policy Enforcement (PEP)
Scenario

Personalize your connectivity

Stay always connected
Wireless Mesh and Sensor Networks

Legend
- Gateway
- Gigabit IP BB / WMN
- Wireless Mesh Router
- SANET gateway
- WLAN gateway

Actuator
- Environment
- Sensor
- Building
- City
- Mesh
Conclusions

CitizenMedia, Magnet-Beyond, ... 

Developments from different IBBT and EC projects:

- Advanced network connectivity
- Context Framework
- Virtual Private Ad Hoc Networks: enabling technology platforms
- Advanced Home and City Services require a number of
Vriendelijke groeten en mijn excuses voor het laatstige antwoord,

Piet

In dit contact wil ik even aankondigen dat ik niet bij de presentatie aanwezig zal zijn vanwege een prioritaire opdracht.

Dag Mevrouw Similjan,

Hierbij de gevraagde info:

- Vertaal: graag 1 overname (di op wo).
- Titel: Advanced Home and City Services
- Abstract:

One of the key issues for future home and city services is the integration of context information into the personalized content and service offering towards the fixed or mobile customer. Context sensing, data gathering and aggregation, user profiling, networking, context-specific service and content adaptation are key issues to be resolved. This presentation will highlight the research performed by the IBCN Broadband Communication Networks research group (UGent-IBBT) in this field. A few case studies will be presented.

Het is belangrijk om de_merge viruses te controleren voordat wij e-mails gaan openen. Ik wil je even opmerken dat er mogelijk een virus is, voor het geval er gevonden wordt. Met vriendelijke groeten,

Marinele Buysse

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Subject: Fwd: Re: I-City: International Event: Mapping the Fundamentals '07; vision on a mobile future
From: Martine Buysse <martine.buysse@intec.ugent.be>
Date: Tue, 24 Apr 2007 09:41:18 +0200
To: davina.stevens@intec.ugent.be
Dear,

Fwd: Re: iCity: International Event: Mapping the Fundamentals 07...

We are honored to have you as one of our speakers at our International Event on March 28 and 29.

On March 27, the event will be opened in style with an exclusive dinner in the company of colleagues and Retalian partners. The conference and event will take place in Hasselt.

We inform you that on the 27th of March, throughout the day, a shuttle service from and to the National Airport Brussels will be provided. Between 26th and 30th of March, this service will be available for your convenience.

We have reserved a hotel and for how long? The hotel is the Radisson SAS at Hasselt.

Furthermore, we would like to have you stay overnight with us the night before the event, in case you are interested in attending the conference the next day. Please let us know if you need assistance in your travel plans.

Reservations are done by nele@silvestrerproductions.be. So, thank you for updating her on your travel plans.

Thank you for your cooperation and we are looking forward meeting you at our event!

C-City Team

Geachte,

We zijn er u te mogen verwelkomen als één van onze sprekers op ons Internationals Event op 28 en 29 maart.

Op 27 maart wordt het event in stijl geopend met een exclusieve diner in de aanwezigheid van collega-sprekers, politici en leden van de Raad van Bestuur. Meer info volgt, maar uw aanwezigheid zou ons heel welkom zijn.

Ons vloei organiseren voor u te garanderen, willen we informeren of:

- u een hotelreservering nodig heeft en voor hoe lang? U overnacht in het Radisson SAS.

Reserveringen worden gedaan door nele@silvestrerproductions.be. Bedankt om aan de hoogte te brengen van uw reservering.

24/04/2007 9:56
Ook willen wij vriendelijk vragen om ons tegen einde volgende week een abstract van max. 4 regels van uw presentatie toe te sturen.

Uw contactpersonen hieronder zijn: els.sevastianis@staff.i-city.be of nathalie.simion@staff.i-city.be.

Alvast bedankt voor uw medewerking en wij kijken ernaar uit te mogen omtreffen.

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