Apply Human Intelligence to Future Generation Network

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Problems with Service Provision

Important issues of service management are missed out in current networks:

- **Users’ social relations with other users**
  - Communications happen between at least two related people

- **Heavy communication burden**
  - More available communication terminals
  - Easily failed calls
Apply Human Intelligence to NGN

- Virtual User
- Social Relations
- Intelligence mechanism
- Parlay/SIP API
- Service Level
- Control Level
- Transport Level
- Access Level
- User
Apply Human Intelligence to NGN

- Set a **virtual user** within network to work for a real user;
- Apply **human intelligence** to the virtual user to deal with communication sessions;
- Consider **users’ social relations** when processing services;
- Connect to service level via SIP API to match a general NGN architecture.
High-level Design – Case One

Before setting virtual users:
- The call from a caller to a callee will go through User-Network-User;
- Assume network works properly, if the callee is not available, the call will still fail.
After setting virtual users, a call will be set up via the following steps:

- **Caller** (real user) first contacts **virtual caller**;
- then **virtual caller** will check with **virtual callee** on whether **callee** is available;
- If yes, a call will be set up between **caller** and **callee**.
High-level Design – Case Two

Procedure with a 3-party call:
- **Caller** initiates a call and the call goes to **virtual caller**;
- **Virtual caller** first checks with **virtual callee** and finds **callee** busy;
- **Virtual callee** further contact **virtual assistant callee** for help;
- **Virtual assistant callee** finds **assistant callee** available;
- A call will finally be set up between **caller** and **assistant callee**.
Functional Design

User
API
Network Intelligence

Server

Registrar
Service Generator
Service Comparator (SC)
Decision Maker (DM)

Database

Service Keeper
Virtual Personal Profile (VPP)
Service Database (SDB)

Control Layer
Transport Layer
Access Layer

NGN Hierarchy API
User API
# Functional Design – Entity Definition

<table>
<thead>
<tr>
<th>Entity</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registrar</td>
<td>Registers a service by characteristics</td>
</tr>
<tr>
<td>Service Keeper</td>
<td>Keeps all current services by characteristics</td>
</tr>
<tr>
<td>Virtual Personal Profile (VPP)</td>
<td>Keeps users’ personal communication profiles</td>
</tr>
<tr>
<td>Service Generator</td>
<td>Generates a virtual service by combing service characteristics and users’ VPP</td>
</tr>
<tr>
<td>Service Comparator</td>
<td>Compares service performance</td>
</tr>
<tr>
<td>Decision Maker</td>
<td>Decides how to deal with a service</td>
</tr>
<tr>
<td>Service Database</td>
<td>Keeps temporarily failed services</td>
</tr>
</tbody>
</table>
Functional Design – Flow Chat

1. Caller
   - Service Keeper
     - 2. Generated Service
       - 3. Service Comparator
         - 4. Decision Maker
         - 5, 10', 11''
         - 6, 11'', 12''
         - 7, 8, 12'', 13''
       - 4, 9''
     - 2
   - VPP_Caller
   - VPP_Callee
   - VPP_Assistant
   - Registrar
   - 2
   - 2
   - 9'''
   - 10'''
   - 8'', 8'''
   - 7'', 7'''
   - Service Database

Callee Or Assistant Callee
Functional Design – Flow Chat

1) Initiate a service session;
2) Register a service;
3) Generate original service;
4) Generate new service (required service);
5) Compare the above two services;
6) Decide how to do with the session:
   - Pass without any condition;
   - Pass with caller’s permission;
   - Postpone till callee changes to be free;
   - Ask third-party for help;
   - Turn to third-party to learn on how to deal with the service.
Apply Intelligence on IMS

Reasons for implementing human intelligence on IMS testbed:
1) IMS is a practical model of general NGN concept
2) IMS emphasizes on services and thus provides interfaces for intelligence
Live Example 1 – Successful service
Live Example 1

- Mr. Pear is Ms. Apple’s new assistant;
- An urgent email is sent to Apple and copied to Pear;
- If both Apple and Pear do not reply in 5 minutes, the service will first turn to Apple’s VPP;
- If Apple’s VPP indicates to call Apple, network will call Apple;
- If Apple does not answer the call, the service will turn to Pear’s VPP;
- If Pear’s VPP does not know how to deal with an urgent email, but it does know learning office rules from Apple;
- Pear’s VPP will learn from Apple’s VPP;
- Pear’s VPP will indicate network to call Pear;
- If Pear picks up the call, the service succeeds.
Live Example 2 – Social Relations

- Mrs. Johns
- Mrs. Smith
- Mr. Smith
- Ms. Green
- Jimmy

- Colleague
- Boss-Employee
- Husband-Wife
- Father-Son
- Mother-Son
Live Example 2

- **Mr. Smith & Mrs. Smith – Family & Equal**
  - Mrs. Smith takes up service when Mr. Smith fails

- **Mr. Smith & Jimmy – Family & Leveled**
  - Deliver service to Jimmy with Smith’s permission

- **Mr. Smith & Ms. Green – Colleague & Leveled**
  - Postpone service to Mrs. Green if not urgent
  - Mrs. Green turn to others if urgent

- **Ms. Green & Mrs. Johns – Colleague & Equal**
  - Turn to Mrs. Johns for help if urgent
  - Learn from Mrs. Johns when no experience
Thank you.

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