3GPP Multi-media Telephony (MMTel) Overview

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MMTel Highlights

- **MMTel – Multi-Media Telephony**
  - A misleading notation
  - No longer the traditional telephony concept ….
  
  but a whole new set of multi-media services delivered to anywhere over any networks on any devices by any medias
MMTel redefines the way people communicate with each other

- From traditional “speech ↔ speech” to “multi-media ↔ multi-media”
- From traditional “presence-not-known” to “presence-enabled”

• Start with contact list
• See who is available
• Select which service/media to use
• Add another media
• Add another session

• Flexible selection of media
• Flexible add / drop media
• Add / Drop participants

• Who is available
• For which service
• For which media
• active phonebook
MMTel Highlights

- MMTel is a “duplicator” of internet Instant Message (IM) services (e.g. Skype)
  - Chat: text message delivery
  - Speech conversation
  - Video communications
  - File (pictures, video clips, data files etc.) transfer
  - Point to point and point to multi-point communications
  - Dynamic session add-on and removal
  - Presence-enabled address book
  - Terminal capability adaptation

- But MMTel is much more flexible and reliable than Instant Message (IM)
  - Mobility support
    -- Anywhere availability
    -- Service continuity and consistency
  - Fix mobile convergence support
    -- Terminating Access Domain Selection
  - Telco-grade service quality, high availability and interoperability
MMTel Service Description

- **Multimedia conversational communications between two or more users**
  - Real time bidirectional conversational transfer of speech, video or optionally other types of data
  - Point to point communications between terminals or a terminal and a network entity

- **Symmetrical or asymmetrical communications**
  - Media components present in each direction may be different, or they may be the same but with different bit rates and Quality of Service
  - Can be started with only one type of media and additional types of media may or may not be added by the users as the communication progress.
  - Media can be removed on request
  - Communication persists as long as there is at least one connected media

- **Support supplementary services**
  - The behaviour of these services is almost identical to supplementary services for CS voice (TS 11) and PSTN/ISDN.
  - When a supplementary service is invoked it applies to all media components
  - A supplementary service can be activated by the user for one or more types of media components.
  - If one or more of these media components are present, the supplementary service is invoked.

- **Universal availability & accessibility**
  - Users are provided with the services regardless of operator and access technology.
MMTel Service Description

- **MMTel service included standardized media capabilities:**
  - Full duplex speech;
  - Real time video (simplex, full duplex), synchronized with speech if present;
  - Chat / Text communication;
  - File transfer;
  - Video clip sharing, picture sharing, audio clip sharing. Transferred files may be displayed/replayed on receiving terminal for specified file formats
  - Fax;
  - Data (over CS).

- **MMTel service delivery key network elements**
  - UE: MMTel service participant
  - MMTel AS: provide supports to all MMTel services
    - It is an implementation decision on how to distribute and locate various functionalities
MMTel Service Descriptions

- **MMTel Specified Supplementary Services**
  - Originating Identification Presentation (OIP)
  - Originating Identification Restriction (OIR)
  - Terminating Identification Presentation (TIP)
  - Terminating Identification Restriction (TIR)
  - Communication Diversion (CDIV)
  - Communication Hold (HOLD)
  - Communication Barring (CB)
  - Message Waiting Indication (MWI)
  - Conference (CONF)
  - Explicit Communication Transfer (ECT)
  - XCAP over Ut interface for Manipulating NGN Services
  - Advice Of Charge (AOC)
  - Closed User Groups (CUG)
  - Three-Party (3PTY)
  - Flexible Alerting (FA)
  - Communication Waiting (CW)
  - Completion of Communications to Busy Subscriber (CCBS)
  - Completion of Communications by No Reply (CCNR)
  - Customized Alerting Tones (CAT)
  - Customized Ringing Signal (CRS)
MMTel Service Description

The Role of Presence

- **Current “Guess-and-ring”**
  - high probability of failure:
    - Recipient status not known
    - inappropriate time (call during meeting)
    - inappropriate media (audio in public place)
  - current solutions:
    - voice mail → tedious, doesn’t scale, hard to search and catalogue, no indication of when call might be returned
    - automated call back → rarely used, too inflexible

- **Future Presence-based**
  - facilitates unscheduled communications
  - provide recipient-specific information
  - only contact in real-time if destination is willing and able
  - appropriately use synchronous vs. asynchronous communication
  - guide media use (text vs. audio)
  - predict availability in the near future (timed presence)
The Level of Presence

**Basic Presence**
- Requirements
  - Availability check:
    + can I set up communications and expect a response now?
  - Appropriateness check:
    + is my call going to interrupt a meeting?
  - Capability check:
    + should I use voice, video or IM?
- Current examples (Yahoo, MSN, Skype)
  - on-line & off-line
    + useful in modem days – but many people are technically on-line 24x7, + need to provide more context
  - simple status
    + not at my desk
    + entered manually
    + does not provide enough context for directing interactive communications

**Rich Presence**
- More information
  - automatically derived from
    + sensors: physical presence, movement
    + electronic activity: calendars
- Rich information:
  - *multiple* contacts per presence
    + device (cell, PDA, phone etc.)
    + service (audio, video, text etc.)
  - activities, current and planned
  - surroundings (noise, privacy, vehicle, …)
  - contact information
  - composing (typing, recording audio/video IM, …)
  - And more ….
The Purposes of Presence

- Provide viewers with better information about the what, where, how the presences are
- facilitate appropriate communications on need:
  - “wait until end of meeting”
  - “use text messaging instead of phone call”
- designed to be derivable from calendar information
  - Plans in calendar reflected in presence information
- Can be provided by sensors in the environment
  - Future extension
- allow filtering by circles
  - Different privacy and presentation level
- Etc…..
MMTel Service Description

- **Presence Capabilities**
  - **Service Capabilities**
    - Audio, application data, control, video, text, message etc.
    - Duplex, simplex
    - Priority
    - Language
  - **Device Capabilities**
    - Mobility
    - Priority
MMTel Service Description

- **Presence for call routing**
  - uses presence information to select suitable contacts
    - advisory only, caller may not adhere to suggestions
  - uses call routing policy informed by presence
    - likely less flexible – machine intelligence
    - route to appropriate destination, media capability, or indicator.
    - try most-recently-active contact first if presence is not clear

- **Presence and privacy**
  - All presence data, particularly location, is highly sensitive
  - Presence information
    - Encrypted binary distribution
    - Retention duration applied
  - Policy rules for access control
    - who can subscribe to my presence
    - who can see what when
**MMTel Service Descriptions**

- **Services based on presence**
  - **Location-based services**
    - Finding services based on location
      - physical services (stores, restaurants, ATMs, …)
      - electronic services (media I/O, printer, display, …)
    - Using location to improve (network) services
      - incoming communications changes based on where I am
      - devices in room adapt to their current users
      - others are (selectively) made aware of my location
      - proximity grants temporary access to local resources
  - **Presence for spam prevention**
    - VoIP spam (“spit”) and IM spam (“spim”) likely to be more annoying than email spam
    - Subscription to another person is indication of mutual trust
    - Use watcher list (who is watching me) as trust vector
**MMTel Service Description**

- **Typical presence information**

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**MMTel Service Delivery**

- **MMTel service delivery includes two major parts**
  
  - **Presence and active phonebook delivery**
    - Presence information collection
    - Presence propagation
    - Presence information presentation
  
  - **Communication service delivery**
    - Session services
      + Chat / instant message
      + Voice call / conference
      + Video call / conference
      + Large file transfer (data, picture, video clip etc.)
    - Page services
      + SMS
      + Small file transfer
**Presence and Active phonebook**

- Protocol: **SIMPLE** (*Session Initiation Protocol for Instant Messaging and Presence Leveraging Extensions*)
  - SIP SUBSCRIBE and NOTIFY extension (RFC 3265)
  - Privacy, policy and provisioning: centralized model
    + authentication policy (RFC 4745, RFC 5025)
    + presence status exchange protocol (**XCAP** over HTTP) RFC 4825
    + subscription event "watcher info“ (RFC 3857, RFC 3858)

- **Competitor: XMPP** (*eXtensible Messaging and Presence Protocol*)
  - XML-based protocol over HTTP
  - near-real-time, extensible instant messaging (IM) and presence information
  - message-oriented middleware
  - RFC3920, RFC3921, RFC3922, RFC3923
MMTel Service Delivery

- Presence propagation example (SIMPLE)

- Subscriber login/register

- Create view (compose)
  - composition policy

- Raw presence document

- Privacy filtering
  - privacy policy

- Watcher filter
  - watcher policy

- Filtered presence document

- Post-processing composition
  - Presence distribution

- Candidate presence document

- Final presence document

- SUBSCRIBE

- NOTIFY

- Diff. with prev. version
**MMTel Service Delivery**

- **Presence Servers**
  - Watcher AS
  - Presence Agent (PA) AS
  - Presence User Agent (PUA) AS
  - Resource List Server (RLS) AS
MMTel Service Delivery

- Presence watcher subscription
MMTel Service Delivery

- Presence Publication

Diagram:

- MS2
- P-CSCF2
- S-CSCF2
- PA

Visisted Net

Originating Home Net

PUBLISH

200 OK

PUBLISH

200 OK

PUBLISH

200 OK

IFC evaluation
Communication Services

- Communication services is the main body of MMTel Services
- Communication services can be
  - Session based services: need to setup sessions to deliver services, e.g. call.
  - Page based services: do not need to setup sessions, e.g. SMS

Session based services
- Single session, dynamic multi-media, asymmetrical communications
- Start with single media session, e.g. text chat, add on more medias such as voice, video, file transfer etc.
- Drop media without dropping sessions, e.g. drop the video media while maintaining the voice or text chat media.
- Media capability can be different on the two sides of a session, e.g. one side has voice and video, the other side has only voice etc.
- Dynamically add on and drop off participants (e.g. conferencing)
- Message Session Relay Protocol (MSRP) for chat text service
  - runs over TCP, SCTP or TLS/TCP etc.
  - runs over media plane

Page based services
- One time delivery service, e.g. SMS
- Can be used to deliver small data files
MMTel Service Delivery

- Text Chat Session: end to end MSRP session
Text Chat Session: Chat Server (multi-party conferencing)
MMTel Service Delivery

- Session service example – add video to existing voice call
MMTel Service Charging

- **Offline Charging Architecture**

- **Online Charging Architecture**
MMTel Service Charging

- **MMTel charging scenarios**

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- **MMTel charging principles**

  - Based in charging information
    - calling user identification
    - called user identification
    - media component characteristics
    - usage (speech, speech with other component, add/retrieve components..)
  - supplementary services applied
  - apply different flexible charging based on supplementary service type and options
References

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