

CONFERENCING USING INSTANT MESSAGING IN THE IP MULTIMEDIA SUBSYSTEM

Jussi Virtanen
jussi.virtanen@ericsson.com

About

- Carried out at Oy LM Ericsson AB, Finland
- Supervised by Prof. Jörg Ott
- Instructed by Ph.D. Janne Peisa, M.Sc. Tuomas Erke

Outline

- Background
- Objective
- IP Multimedia Subsystem
- Instant Messaging Service
- Message Session Relay Protocol
- Prototype Implementation
- Protocol Analysis
- Conclusion

Background and Objective

- Instant messaging is a popular form of communication both on the Internet and in mobile networks
 - America Online (AOL), MSN, Yahoo!
 - Apple iChat, Google Talk
 - Short Message Service (SMS), Multimedia Messaging Service (MMS)
- An instant messaging service is one of the initial services in the IP Multimedia Subsystem (IMS)
- The objective is to study the issues related to the implementation of the instant messaging service
 - Prototype implementation
 - Protocol analysis

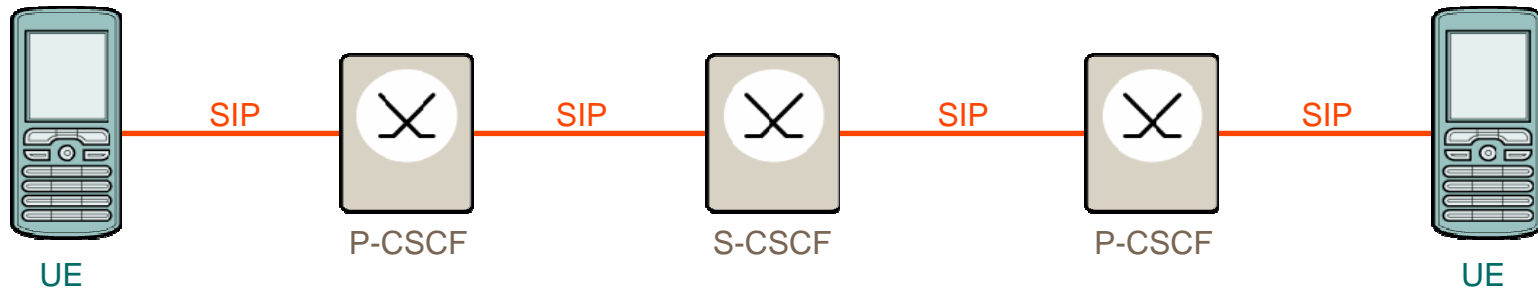
IP Multimedia Subsystem

- A unified architecture for multimedia service provision on IP networks
- Specified by 3GPP for third generation mobile networks
- Adopted by ETSI for next generation networks
- Based on protocols developed by the IETF
 - Session Initiation Protocol (SIP) for session control
 - H.248 for media resource control
- Follows a layered architecture
 - Service Plane: service provision
 - Control Plane: session control
 - User Plane: processing of payload traffic

Instant Messaging Service

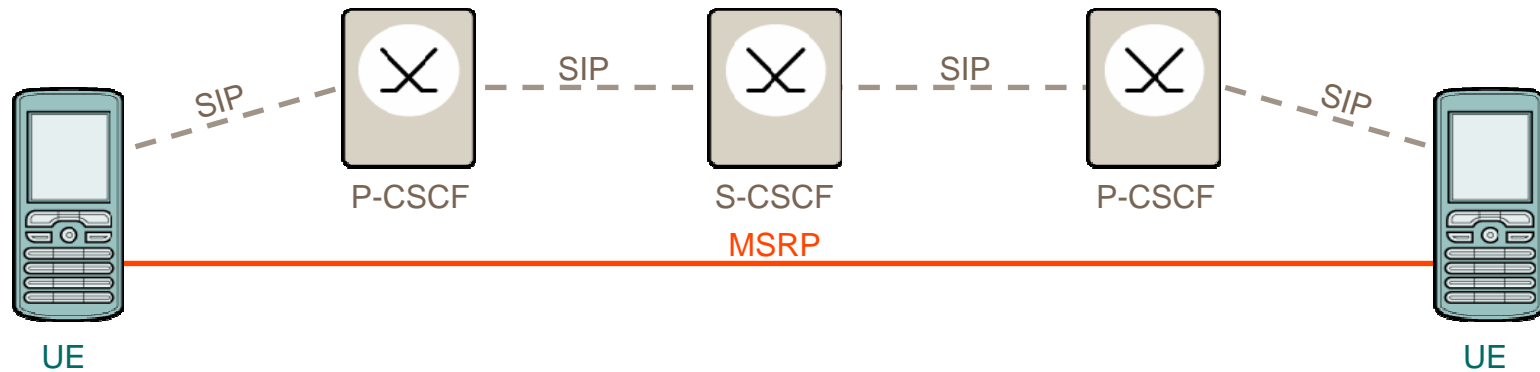
- One of the initial services
- Comprises of two different solutions
- Page-mode messaging service
 - One-off messages in one-to-one or one-to-many fashion
 - Resembles SMS and MMS
- Session-mode messaging service
 - Messaging sessions between two or more participants
 - Resembles services on the Internet

Page-mode Messaging Service



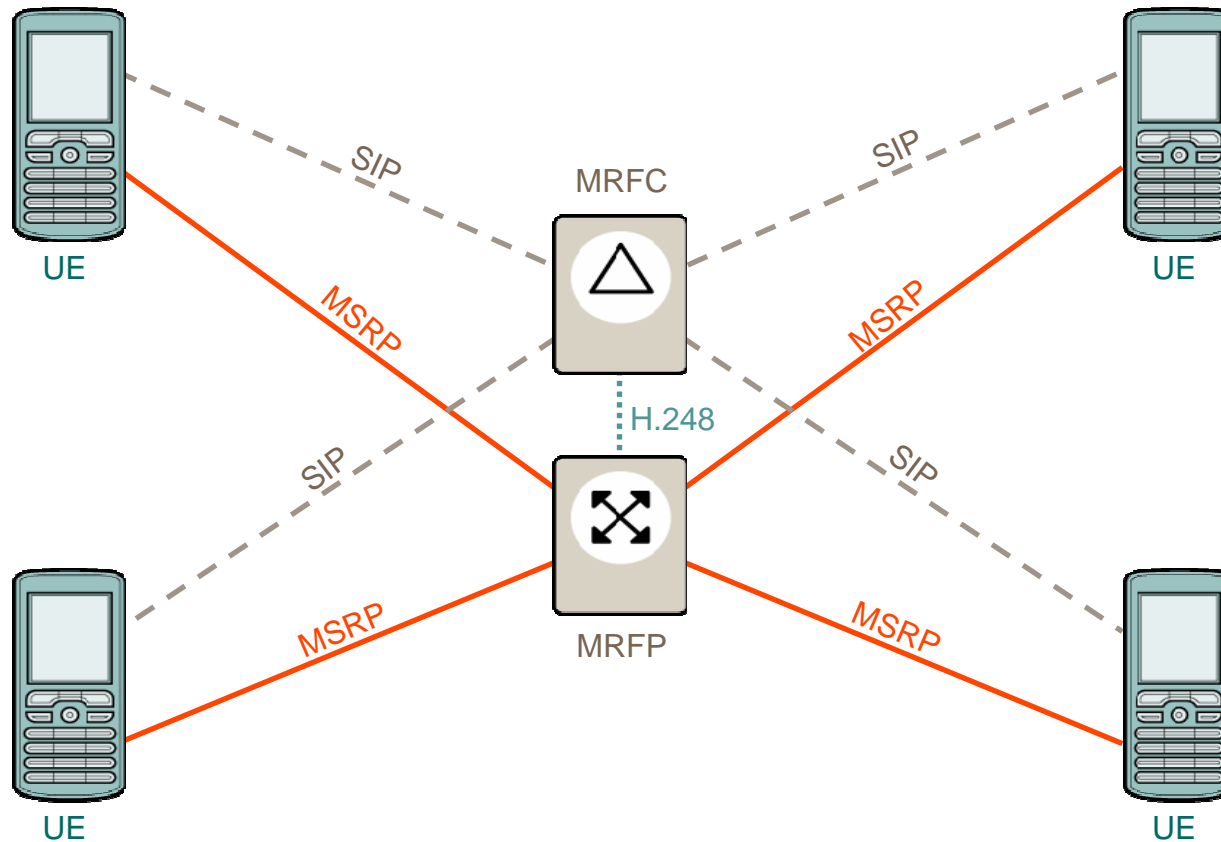
- A message is sent using a SIP MESSAGE request
 - Messages traverse on the Control Plane
 - Subsequent messages bear no association to each other
 - Sending a message is fast
 - Each message strains the Control Plane
- Introduced in 3GPP Release 5 (IMS Phase 1)

Session-mode Messaging Service



- A messaging session is established using a SIP INVITE request
 - Messages traverse on the User Plane
 - Subsequent messages are associated by the messaging session
 - Establishment of the messaging session causes a slight delay
 - MSRP is used as the transport protocol on the User Plane
- Introduced in 3GPP Release 6 (IMS Phase 2)

Conferencing Using the Session-mode Messaging Service



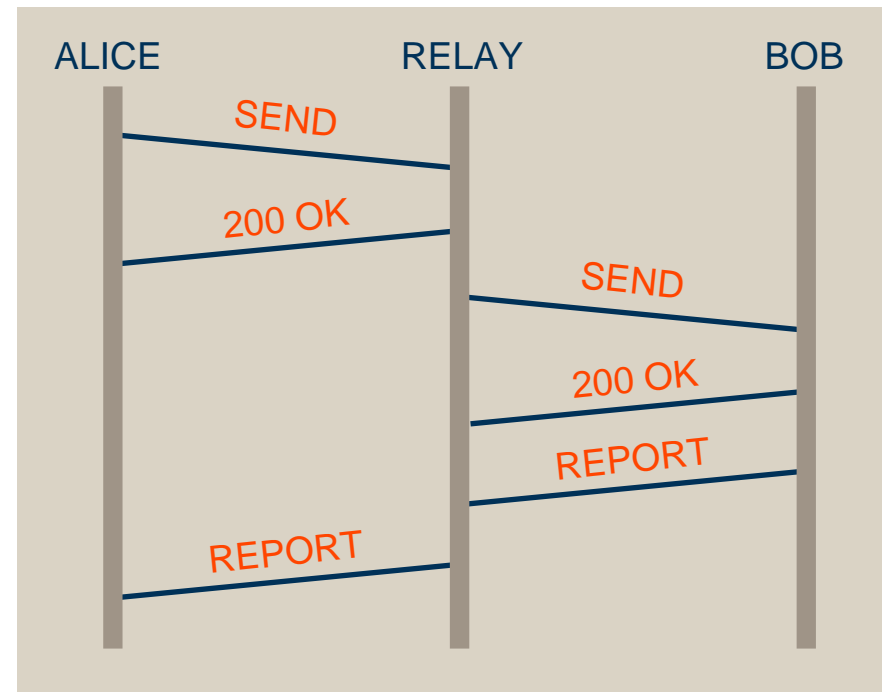
Message Session Relay Protocol

- The SIP Instant Messaging and Presence Leveraging Extensions (SIMPLE) working group at the IETF
- An application layer transport protocol for the exchange of messages between two endpoints
- Requires transport with congestion control (TCP) and a session control mechanism (SIP)
- Provides reliability, shared transport layer connections and segmentation of messages
- Messages can pass through a chain of relays
 - Policy enforcement
 - Firewall traversal

Example

```
MSRP kefNU9K8 SEND
To-Path: msrp://10.0.0.3/snwK;tcp
        msrp://10.0.0.2/zsLi;tcp
From-Path: msrp://10.0.0.1/1IPx;tcp
Message-ID: 3C4bODiv
Success-Report: yes
Byte-Range: 1-13/13
Content-Type: text/plain

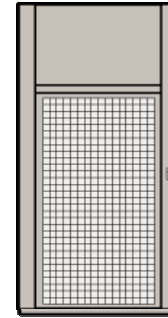
Hello, Bob!
-----kefNU9K8$
```



Prototype Implementation



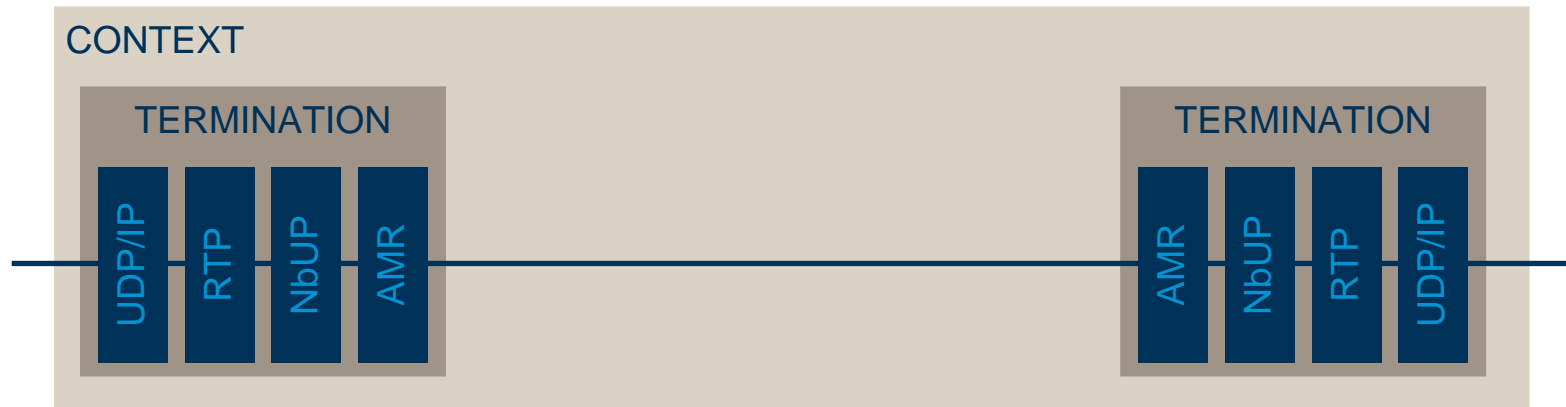
Ericsson Session
Gateway Controller



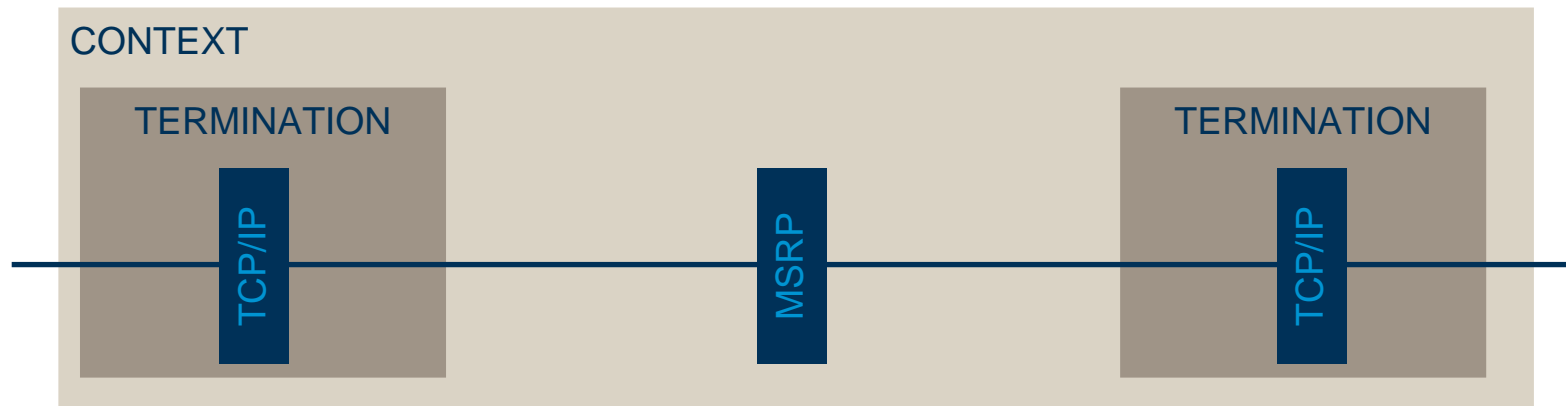
Ericsson Media Gateway
for Mobile Networks

- Ericsson Session Gateway Controller (SGC) as Media Resource Function Controller (MRFC)
 - Implementation of a Session Border Controller (SBC)
- Ericsson Media Gateway for Mobile Networks (M-MGW) as Media Function Processor (MRFP)
 - Implementation of a Circuit-Switched Media Gateway (CS-MGW) for the Circuit Switched (CS) Domain of the 3GPP architecture

Example



Nb-Nb Call in the CS Domain



MSRP Session in the IMS

Protocol Analysis

- Evaluation
 - MSRP as a medium in multimedia sessions
 - MSRP as a transport protocol on the Internet
- Comparison
 - MSRP in comparison to two related protocols
 - Both protocols were considered candidates for the task MSRP is designed to cater
- Improvements
 - Evolution of MSRP in the future

Evaluation

- **Scalability**
 - How well are considered problems related to the scale of deployment in MSRP?
- **Efficiency**
 - How much overhead imposes MSRP on payload transfer and payload processing?
- **Simplicity**
 - Is the complexity of MSRP as low as possible?
- **Extensibility**
 - How can MSRP be extended in the future?
- **Robustness**
 - Does MSRP cope well with failures?

Comparison

- Extensible Messaging and Presence Protocol (XMPP)
 - Both the protocol and payload use Extensible Markup Language (XML)
 - Same problem domain, different approach

- Blocks Extensible Exchange Protocol (BEEP)
 - Strives for similar status in peer-to-peer applications as Hypertext Transfer Protocol (HTTP) has achieved in client–server applications
 - Different problem domain, similar solution

Improvements

- **Alternative Transports**
 - Stream Control Transport Protocol (SCTP)
 - Datagram Congestion Control Protocol (DCCP)
 - Message-based transport layer protocols

- **Message Compression**
 - Signalling Compression (SigComp)
 - Already used in the IMS for SIP

Conclusion

- The session-mode messaging service is favourable from the point of view of a network
 - Payload traffic should not consume resources on the Control Plane
- MSRP as the implementation of the session-mode messaging service requires still consideration
 - Follows the footsteps of Real-time Transport Protocol (RTP) as a medium in multimedia sessions
 - Does not yet entirely fit into the role established by RTP

ERICSSON 

TAKING YOU FORWARD