Platform and Network Independent Multimedia Services

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Abstract

An open MultiMedia Messaging infrastructure is described which is based on TCP/IP and HTTP/SOAP. This has the advantage that it allows peer-to-peer MMS messages without any dependency on proprietary communications protocols or networks. Client appliances register with a central server which forwards MMS messages between clients. The server incorporates cache management, transcoding and dispatcher modules to facilitate this functionality.

1. Introduction

Today's consumer marketplace is crowded by an increasingly sophisticated set of handheld computers, PDA's, MP3 players and mobile phones. As these appliances evolve they have begun to offer quiet sophisticated multimedia capabilities: many PDA's can capture pictures or even video shorts; mobile phones can play MP3 music and the latest models have built-in digital cameras; the latest PDA's have the same multimedia capabilities as desktop computers had 2 years ago.

Early generation appliances typically relied on a hard-wired connection to a desktop computer in order to communicate with the outside world, but most present-generation devices have their own inbuilt communications transceivers: infra-red, 802.11b, Bluetooth or GSM/GPRS. With each new generation these handheld devices become more independent and capable.

In this context of a new generation of mobile heterogeneous computing we can see a rapidly emerging need for the users of such devices to share and exchange multimedia assets. Further it is inevitable that this new generation of appliances will require new, improved methods of sharing and transferring these assets. The old desktop metaphors of E-Mail and File Transfer will not satisfy the needs of many users of these new appliances.

One emerging standard has already appeared in the mobile phone sector where major players have created a new industry standard for Multimedia Messaging on GSM/GPRS phones. However, although this standard is admirable in its intent it is highly specific to the proprietary GSM/GPRS networks used by these phones. If I want to send a message from phone-to-phone it is ideal, but if I want to send the same message to an Internet-enabled PDA I can't because that PDA is not connected to the GSM/GPRS network.

In this paper we examine the problems encountered in dealing with mobile heterogeneous network clients. Further we propose an open solution, based on TCP/IP and HTTP/SOAP which encompasses all current networks and allows users of different network services to interoperate, sending MMS messages to each other.

We describe our experiences in implementing just such a data service to allow the transfer of digital pictures, video and MP3 files between a range of PDA's, mobile phone appliances and standard desktop PC's. Our prototype system can integrate 802.11b, GSM/GPRS and wired networks using peer-to-peer MMS. Users need only register their appliance with a central server in order to send and receive a variety of MMS services.

```
<smil>
 <head>
  <layout>
   <root-layout height="225" width="150"
background-color="#ffffff" title="Sync"/>
   <region id="timing" width="150"
height="75" top="0" left="0" z-index="1" />
   <region id="is" width="150" height="75"
top="75" left="0" z-index="1" />
   <region id="everything" width="150"
height="75" top="150" left="0" z-index="1"
/>
  </layout>
 </head>

 <body>
 <seq>
  <img src="smpl/0a.gif" region="everything"
dur="0.5s" />
  <img src="smpl/1a.gif" region="everything"
dur="0.5s" />
  <img src="smpl/2a.gif" region="everything"
dur="0.5s" />
  <par>
   <img src="smpl/3a.gif"
region="everything" dur="8" />
   <img src="smpl/test.gif" region="timing"
dur="4" />
   <img src="smpl/more.gif" region="is"
dur="6" />
  </par>
 </seq>
 </body>
</smil>
```

Fig.1 Example SMIL format for an MMS message..

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2. MultiMedia Messaging (MMS)

MMS is the evolution of SMS, the Short Messaging System, a system for sending and receiving short text-based messages. MMS is the next generation upgrade for SMS in 3G networks. However, MMS does not require a 3G network. It is intended to provide a rich set of content to subscribers in a messaging context. It supports both sending and receiving of such messages by properly enabled client devices.

MMS is a system application by which a client is able to provide a messaging operation with a variety of media types. The first generation of MMS messages should be thought of as "Slide shows". SMIL (Synchronized Multimedia Integration Language), is the layout language that is used for creation of multimedia presentations consisting of multiple elements in a common, synchronized timeline. Visually, SMIL is strikingly similar to HTML in its syntax and constructs.

3. Server-Side Infrastructure

In ***Fig 2*** we show a top-level diagram of this open MMS infrastructure. In addition to the illustrated functionality modules the server keeps a database of registered users and a log of message traffic which can be used for billing purposes. These details are not covered by ***Fig 2***.

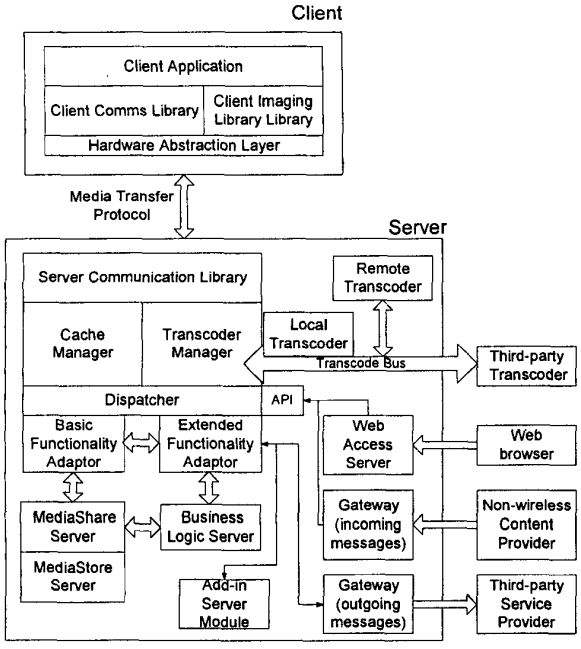

Fig 2 Infrastructure for Open-MMS Messaging.

In the present implementation a small client-side library is required, although this could be loaded dynamically from the network if an appliance supports Java. However the bulk of the asset management, transport and translation activities occur on the server. The server-side infrastructure features a set of modular software components. These include:

Communications Server: This manages the sending and receiving of messages in the same fashion as a SMTP server manages E-Mail. However, as we use SOAP/XML the server can be more flexible in how it handles and subsequently manages the transport of received messages.

Cache Manager: Provides temporary storage for messages before they are transcoded or otherwise processed by the server. Scalability and efficiency are important issues for a system which is dealing with large volumes of multimedia assets.

Transcoder: This performs a translation/transcoding of the multimedia data to suit the recipient device. The required information on a client is provided during the registration process. Transcoder capabilities for still images include auto-resizing, colour depth reduction, auto-rotate, and auto-convert (for formats other than JPeg). Additional capabilities under development include similar functionality for MP3 and MPEG files.

Dispatcher: This module manages the dispatch of a message once it has been transcoded, or otherwise modified by the server. Messages may be sent to the communications server and from there relayed to the recipient – a TCP/IP client. Alternatively they may be diverted into a 3rd party service to provide storage, sharing or message transport over a proprietary network infrastructure.

4. Client-Side Access

The key factor which differentiates this solution from other proprietary MMS solutions is that it can operate with any appliance which has an Internet connection. It does not matter whether this is achieved via a dial-up PPP connection, over an 802.11b or Ethernet network or even via a GSM/GPRS mobile phone.

In the present implementation a small client-side library is required, although this could be loaded dynamically from the network if an appliance supports Java. The client library is implemented in C and is designed to be easily portable across a broad range of embedded appliances. From a practical point of view the client library can be ported to any OS which supports TCP/IP sockets. Currently we have ports available for WinCE, Pocket-PC, EPOC, Linux and DOS. Additional ports are underway for PalmOS and BREW.