White Paper

Video sharing – Enrich your voice call with video

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Contents

Executive summary

Internet connectivity is expanding rapidly with the growth of high-speed access technologies, while emerging wireless technologies such as EDGE, WCDMA and CDMA are making IP convergence a reality with connections to the Internet.

IP is now widely accepted as the technology that will provide the platform for future services. The first IP convergence applications such as video sharing and Push to talk over Cellular (PoC) are already emerging in the market and will change the way we communicate. Video sharing is a new compelling service based on open standards, one that will encourage users' spontaneity as well as create new business opportunities.

New compelling service

Dozens of mobile operators have piloted and launched mobile video services, which are evolving with the addition of high-quality video streaming and real-time person-to-person communication, opening up even more opportunities. The introduction of person-to-person video sharing during a voice call is a key evolutionary step for mobile video services.

Spontaneous user behaviour

Sharing live video or video clips in real time during a normal voice call allows users to enrich their communication easily. Users can add and remove the video element as they want, sharing live camera views or video clips from the device.

New business opportunities

Video sharing is a new compelling service that enhances a voice call with the ability to share videos among users, providing new business opportunities for mobile operators. It will produce a new stream of user-generated packet data traffic and thus increase operator revenues. Video sharing is made possible through WCDMA networks and uses general IETF SIP or IMS infrastructure, which operators can also use in other compelling IP convergence services.

Based on open standards

Video sharing is implemented using open standards such as 3GPP and IETF technologies. Open standards are essential to the mass deployment of mobile video services, as well as to prevent market fragmentation, by maximizing the number of potential customers using compatible solutions.

Video services overview

Dozens of mobile operators have piloted and launched mobile video services, which are evolving with the addition of high-quality video streaming and real-time person-to-person communication, opening up even more opportunities. For example, ARC Group estimates that the number of Worldwide Mobile Video Users may grow to 24 million in 2004 and more than ten times larger, to 247 Million, in 2008 *(Mobile Video – Worldwide Market Analysis & Strategic Outlook 2003–2008, ARC Group)*. Today, some 60 operators have launched mobile video services according to press releases and other public sources.

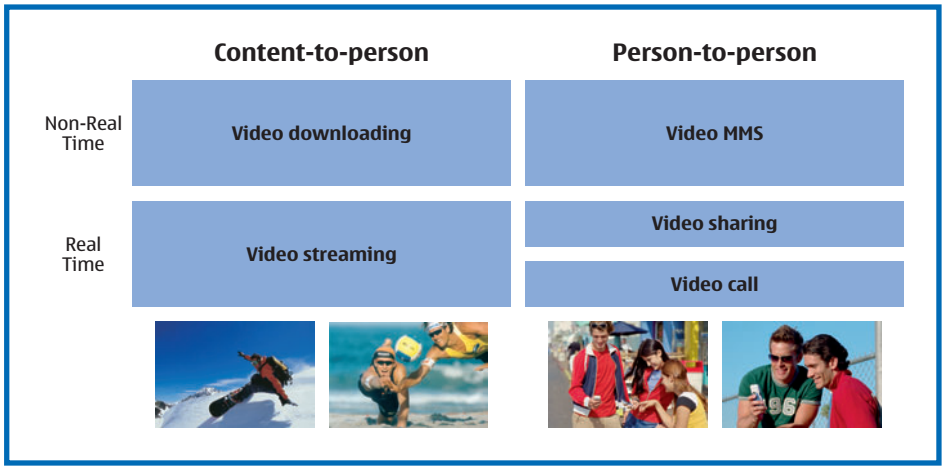

Figure 1. Mobile video services

Content-to-person video services

Content-to-person "video messaging" refers to a case where the video clip originates from a commercial service on a pull or subscription push basis. Digital rights management will define the usage rules for commercial quality content, while the available memory capacity of the device will determine storage possibilities.

"Video download", as the name implies, refers to the delivery of video clips to a mobile device, usually through discovery such as mobile browsing and then followed by a TCP/IP session where the clip is sent to the device to be viewed or stored. Similarly, digital rights management and available device memory apply regarding local storage on the device.

"Video streaming" indicates immediate consumption of on-demand or live video content on a mobile device – the content is not stored on the device. This method allows the consumption of large video files without any dependence on device memory, since the file is not physically stored on the client. As a result, digital rights management is not an essential factor for video streaming.

Person-to-person video services

Person-to-person video communication in mobile devices started with "video messaging" or video MMS, a natural evolution from still image-based multimedia messaging. Video recording, now available on a wide range of camera phones, allows the user to record a video clip and send it to another mobile device within a multimedia message. It can be opened and played back for viewing or saved on to the device memory if desired and allowed.

"Video sharing" allows mobile users to share one-way video in real time, while they are already active in a voice session. Because the user can decide to add video after making a usual voice call, this is a great way to gain additional revenue from voice calls and differentiate within 3G services. WCDMA operators can offer one-way video sharing as an enhancement to existing voice calls that increases both user satisfaction and operator revenues. Radio access may in the future also be EGPRS with DTM or CDMA2000.

"Video call" is about making or receiving a call in which the mobile user can see as well as talk to the other person during the entire call. In effect, it gives the user both visual and verbal communications. As opposed to the spontaneous nature of video sharing in which video can be added to a standard voice call, the user initiates a video call as a video call and the video element is present throughout. Video call is supported in the first phase by circuit switched technology, but in the future rich calls will be supported by IP-based video telephony.

Person-to-person video services evolution

IP convergence is the fusion of the mobile and Internet domains, using packet-based networks as a common infrastructure to enrich the way we communicate. IP convergence is already happening. Today, GPRS provides connections to the Internet, and connectivity is rapidly expanding with the growth of EDGE, WCDMA, CDMA, WLAN, ADSL, and other access technologies. IP is now widely accepted as the technology that will provide the platform for future services.

- IP convergence will greatly enhance person-to-person communications by combining voice, video, and other interactive communications services, enriching the way we interact and communicate.
- The key to the rich call concept is the end-user experience – end users will benefit from the combination of availability, rich communication, and shared content.
- New packet-based communication services such as PoC and video sharing are already emerging, and will enrich the way we communicate.
- Innovative new services will emerge as the use of Internet protocols is combined with peer-to-peer connectivity provided by Session Initiation Protocol (SIP). This will be driven by the availability of SIP application programming interfaces (API) and software development kits (SDK) for the developer community.

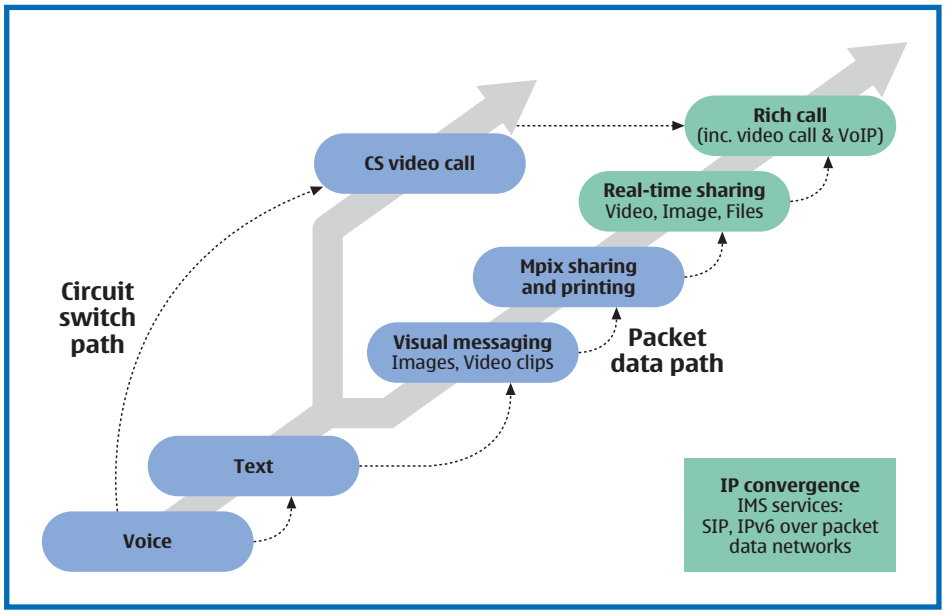

Figure 2. Evolution to new IP based services – the packet data path allows evolution from visual messaging to video sharing and rich call.

The first IP convergence services, such as video sharing and content sharing, are key steps in the evolution towards rich calls. This is a concept for session-based communication in the form of voice, video, and text, supported with parallel sharing of content, either image, data, or other value-added information, between conversation participants.

The rich call concept is a framework that will combine a common set of enablers and technologies such as presence, PoC, video sharing, messaging, etc., into a seamless and coherent user experience. If SIP is the engine for the rich call concept, then common group management and presence are the catalysts, enabling subscribers to initiate the services and select from a range of communication modes.

The key to the rich call concept is the end-user experience – the value and potential of combining availability with rich conversation and the sharing of content to provide enriched services. Users will be able to switch seamlessly between interaction modes, providing a more coherent user experience.

Introduction to video sharing

Figure 3. Video sharing between two devices can be spontaneous and fun.

The introduction of person-to-person video sharing during a call is a key evolutionary step for mobile video services and is initially a key differentiating WCDMA service. Video sharing in real time during a normal voice call allows users to enrich their communication with ease. One or other of the users can share a live camera view or video clips from the device. Both users see the same video and can discuss it while they continue their voice call. Users can add and remove the one-way video element spontaneously as needed.

A recent IP Multimedia study commissioned by Nokia shows that consumers like voice calls enhanced by video sharing. The fun aspect is seen as very important and video sharing is considered very useful, being seen as a clear progress from MMS based video messaging. Consumers would like to share the moment e.g. when on holiday, shopping, family outings or a Saturday night out. Video sharing could also provide a sense of personal security by showing where you are and with whom. There are also a number of business use cases identified, such as real estate, sales, and checking work in the field remotely.

Key benefits for user

- Video sharing is a natural expansion of voice calls
- Share the moment or the surroundings spontaneously
- Adding and removing video element flexibly
- Easy to use application for both consumers and business

Key benefits for operator

- New compelling service that provides new business opportunities for mobile operators
- Produces a new stream of user-generated data traffic. This will increase the operator (packet data) revenues generated during voice calls
- Uses common infrastructure with other SIP-based applications such as PoC, offering lower investment barrier to setting up services
- Sharing video via a packet-switched (PS) network is more cost-effective than via a circuit-switched (CS) network. For example, a three-minute voice call with a 30-second video sharing session uses only 33% of the network resources used by a three-minute CS video call.
- The evolution of PS video services allows convergence of video sharing between the mobile and the PC domains, greatly increasing the potential video sharing user base
- PS video services have a clear evolution path for improved video quality, efficiency, and new service creation.

Figure 4. UI flow of video sharing example. Actual implementation may vary from this example.

Enrich your voice call with video

Keith and Malcolm are in a standard CS voice call and Keith wants to share live video with Malcolm. They both have devices capable of video sharing and are registered for the service. The sample UI flow is described below and in the Figure 4.

- During the ongoing CS voice call, Keith chooses to share the live video
- Keith confirms Malcolm as a recipient
- Malcolm receives video request from Keith and accepts it
- The system shows the acceptance to Keith, who activates the sending of the video stream
- Malcolm's device starts showing the same video as Keith's device. They can discuss it via the voice call.
- Keith ends the video sharing when he has shown what he wanted. The voice call between Keith and Malcolm remains active.

Typical use cases

Lucy and Kate are close friends with active social lives. Lucy is on her way home from work. She calls her friend Kate to see what her plans are for the evening. Kate tells Lucy that she is at a party. In order to show Lucy what is going on at the party, Kate starts to share her live camera view. As Lucy watches the live video stream, she can ask Kate to move the camera around, so she can see all her friends having a great time. Kate ends the video sharing session and Lucy wishes best regards to her friends. Kate continues partying with her friends, leaving Lucy to wish she could join the party as well.

Mike is a civil engineer responsible for a new building development. While he's in the office he calls his colleague, Maria, on his mobile to get the latest project status. Maria is at the construction site and lets Mike know they have a problem that Mike should have a look at. Rather than making the journey down to the site, Mike asks Maria to share her camera view. Maria sends the live video stream from her mobile to Mike's desktop PC (which has a SIP-based PC client installed). Mike can see the problem and asks Maria to show another part of the site while they are talking. Once Mike has seen enough, Maria ends the video sharing and they continue their call, discussing the problem. Mike suggests a solution to the issue, and is relieved he didn't have to make the trip in rush hour traffic.

Figure 5. Use case example: The party.

Figure 6. Use case example: Construction site.

Technologies based on open standards

Video sharing is initially a key WCDMA differentiating service and is implemented using open standards based technologies such as IETF SIP, IP Multimedia Subsystem and 3GPP codecs. Open standards are essential to the successful launch of the service, and to prevent market fragmentation by maximizing the number of potential customers using compatible solutions. Video sharing is a person-to-person service and in most cases the shared video is also personal. In the case of DRM-protected commercial video clips, video sharing must not be enabled.

Nokia is aiming for fast introduction of video sharing services and is co-operating with key operators and other vendors to promote interoperability. Interoperability of network infrastructure will be achieved by complying with standards. Nokia is making the video sharing technical description available in order to promote the interoperability of mobile handset applications as well.

Bearers

Video sharing uses WCDMA networks as WCDMA bearers give better throughput for the video, and allow concurrent use of circuit switched voice. Introduction of Quality of Service in the network and terminals will enhance the user experience by providing guaranteed bit rates for the video and minimizing the end-to-end latency. The goal is to have a bearer-independent service, with radio access in the future possibly also being via EGPRS with DTM or CDMA2000. Video sharing may also be available through WLAN.

Codecs

Video Sharing uses the same audio and video codecs that are mandatory for 3GPP PSS streaming and conversational multimedia applications. The baseline codecs supported are:

- Video codec: H.263
- Audio Codec: AMR NB

Additional codecs may also be supported.

Session Initiation Protocol

Video sharing uses general IETF SIP or IMS infrastructure. The infrastructure is common to all SIP-based person-to-person services and, using SIP, the services are easy to implement, manage, and control. The development and introduction of new services is therefore simpler than with other protocols. Once the session is established, the actual media is routed as any IP traffic in the existing operator IP core. SIP will be the standard signaling protocol/mechanism to support multimedia sessions in 3GPP Release 5 networks and beyond. This choice ensures that future multimedia services will be truly Internet-based. SIP provides the essential elements for video sharing before, during, and after the call.

More information about SIP is available from 'White Paper: IP Convergence Based On SIP – Enhanced Person-to-Person Communications' (available at http//:www.forum.nokia.com).

Network readiness

Video sharing is enabled in WCDMA networks and uses general IETF SIP or IMS infrastructure. Detailed system requirements to support video sharing depend on the network environment and the way the operator intends to deploy the service – this might range from pure connectivity between terminals to the support of sophisticated QoS and charging mechanisms.

WCDMA radio access networks support concurrent CS and PS bearers as a basic feature of the 3GPP Iu interface specification. Thus it is possible to have an active CS voice call concurrently with an active video sharing media streaming session. This requires support of one CS and one PS radio access bearer concurrently. The packet bearer carries both SIP signaling and the video sharing media stream. This infrastructure can also be used for other interactive services, for example, P2P gaming and content sharing.

Video sharing enhances voice calls with one-way video. The voice call is circuit-switched as usual through the existing CS core network without additional requirements. The video session is established using SIP signaling and IMS. The video stream uses the packet core network. Voice, video and audio components of video sharing are concurrent and therefore require a WCDMA network.

Building blocks for successful service launch

Video sharing brings new business opportunities to mobile operators. It is operated over WCDMA networks and uses general IETF SIP or IMS infrastructure, which operators can also use for other compelling IP convergence services. For the service to take off, it is essential to make it as easy as possible to discover and activate, achieved by pre-configuration of the settings or sending them over the air with OMA Client Provisioning. Furthermore, it is very important to define simple pricing schemes that are easy to understand. Service interoperability is also a key success factor, especially for person-to-person services.

Clear pricing

Video sharing is a packet-switched service that creates packet data traffic both for the sending and receiving party. Market conditions and consumer expectations differ market by market. Therefore the best charging solution depends on the capabilities of an operator's existing billing system and its charging philosophies. Furthermore, an affordable pricing model that is easy to understand is a key to users accepting a new service. The video sharing charging model can today be created using one or a combination of the following options:

- Users pay volume based charging
- Users pay a session establishment fee
- Users pay a fixed monthly fee

Service interoperability between market participants

Video sharing uses standard components (IP, SIP, IMS, codecs) and Nokia is willing to co-operate with other vendors in interoperability. The successes of messaging, both SMS and MMS, have shown that service take-up increases once operators in a specific market agree on interconnection and roaming with other operators. Thus, a similar approach is recommended in the case of video sharing.

Simple service activation and discovery

It is important for both the phone users and the service providers that the right device settings are either preconfigured or can be installed over the air using OMA Client Provisioning. In a case where a user account has specific settings, the over-the-air method is the only way to get the correct settings to the device without the user having to key in the data himself. A service provider can make this easy by offering automatic device configuration over the air, for example, when the device connects to the network for the first time. However, a more widely deployable solution is to offer users simultaneous video service activation and device configuration in the operator's mobile portal.

Seamless and easy to understand service activation and configuration is essential to encourage all users to start experimenting with rich media services. Discovering any new service should be simple – the goal is to get users to try new services and to integrate them into their regular lifestyle so that they will use them for a long time. By offering new video services as an extension to existing services such as basic voice, users will find the new features easier to accept and intuitive to understand.

Conclusions

IP convergence will play a significant role in making the Nokia vision come true. Nokia envisions a mobile life where mobility has pervaded all facets of everyday life. In this world, users will have the ability to access, create, consume, and share digital content using interoperable devices that are connected with each other anytime, anywhere. This creates an increasing demand for bandwidth, connectivity features, and economy that cannot be served by today's circuit-switched mobile networks. Implementing this vision requires the kind of knowledge that Nokia has of the mobility business – both infrastructure and terminals – and the Internet.

Nokia is implementing video sharing using standard components and aiming for fast introduction of the service. It is also willing to co-operate with other vendors in interoperability – interoperability of network infrastructure will be achieved through complying with standards. While Nokia is making available the video sharing technical description in order to promote the interoperability of mobile applications.

Video sharing is a compelling new service that provides new business opportunities for mobile operators and represents a natural expansion of today's robust and well-understood voice calls. Users can share video spontaneously to enrich their discussions, adding and removing the video element when they want. Its major advantage is that video sharing is an easy-to-use application that supports both consumer and business use cases with attractiveness and ease.

Glossary of terms

3GPP	3rd Generation Partnership Project
ADSL	Asymmetric Digital Subscriber Line
API	Application Programming Interface
CS	Circuit Switched
DRM	Digital Rights Management
DTM	Dual Transfer Mode
EDGE	Enhanced Data rates for GSM Evolution
GPRS	General Packet Radio Service
HTTP	Hypertext Transfer Protocol
IETF	The Internet Engineering Task Force
IMS	IP Multimedia Subsystem
IP	Internet Protocol
MMS	Multimedia Messaging Service
OMA	Open Mobile Alliance
PoC	Push to talk over Cellular
PS	Packet Switched
PSS	Packet Switched Streaming
P2P	Person-to-person
QoS	Quality of Service
SDK	Software Development Kit
SIP	Session Initiation Protocol
SMS	Short Message Service
WCDMA	Wideband Code Division Multiple Access
WLAN	Wireless Local Area Network

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