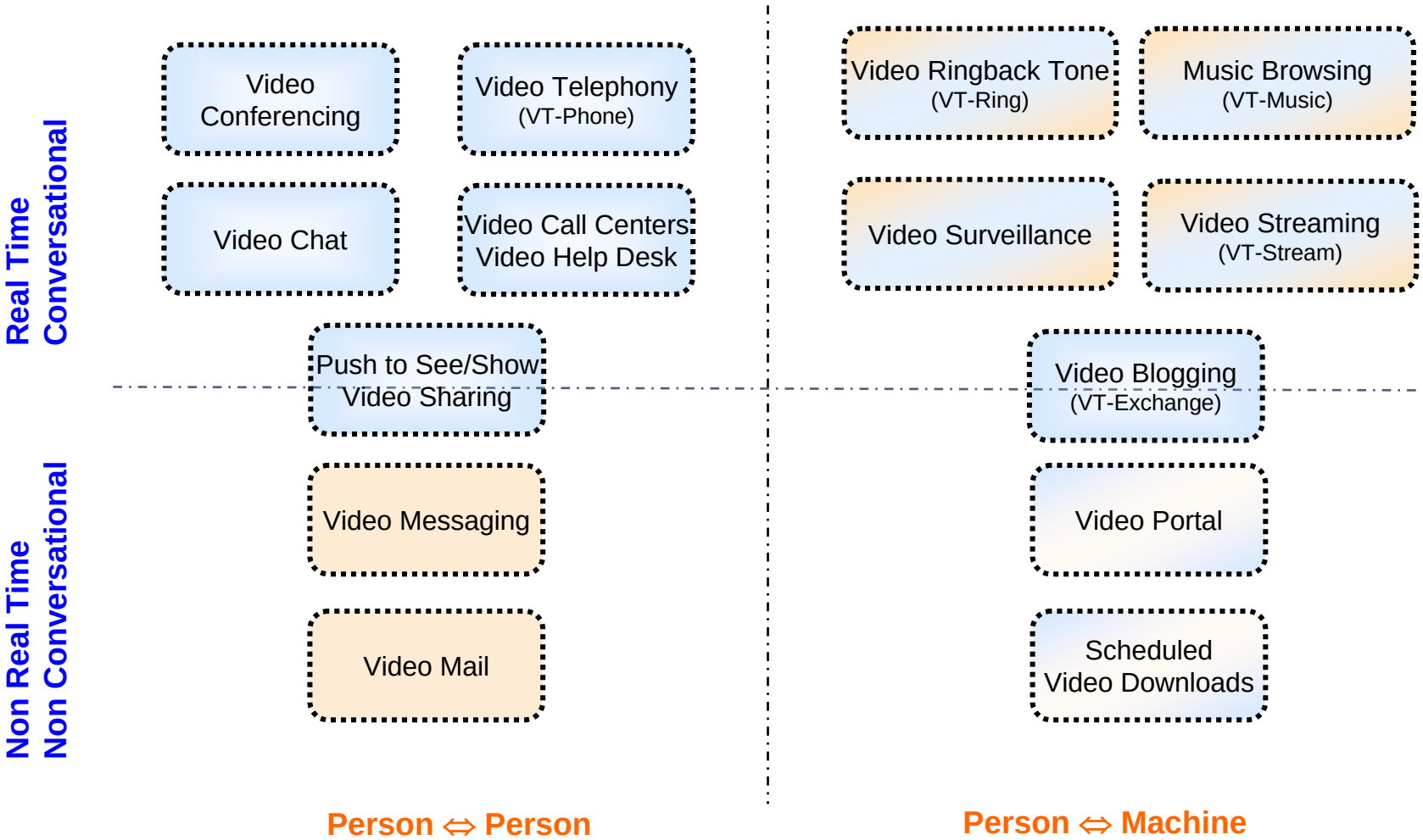
International Multimedia Telecommunications Consortium

Dr. Marwan Jabri
Founder and CTO
Dilithium Networks

Multimedia Technologies for Convergent Networks

IMTC Spring Forum
May 11, 2006

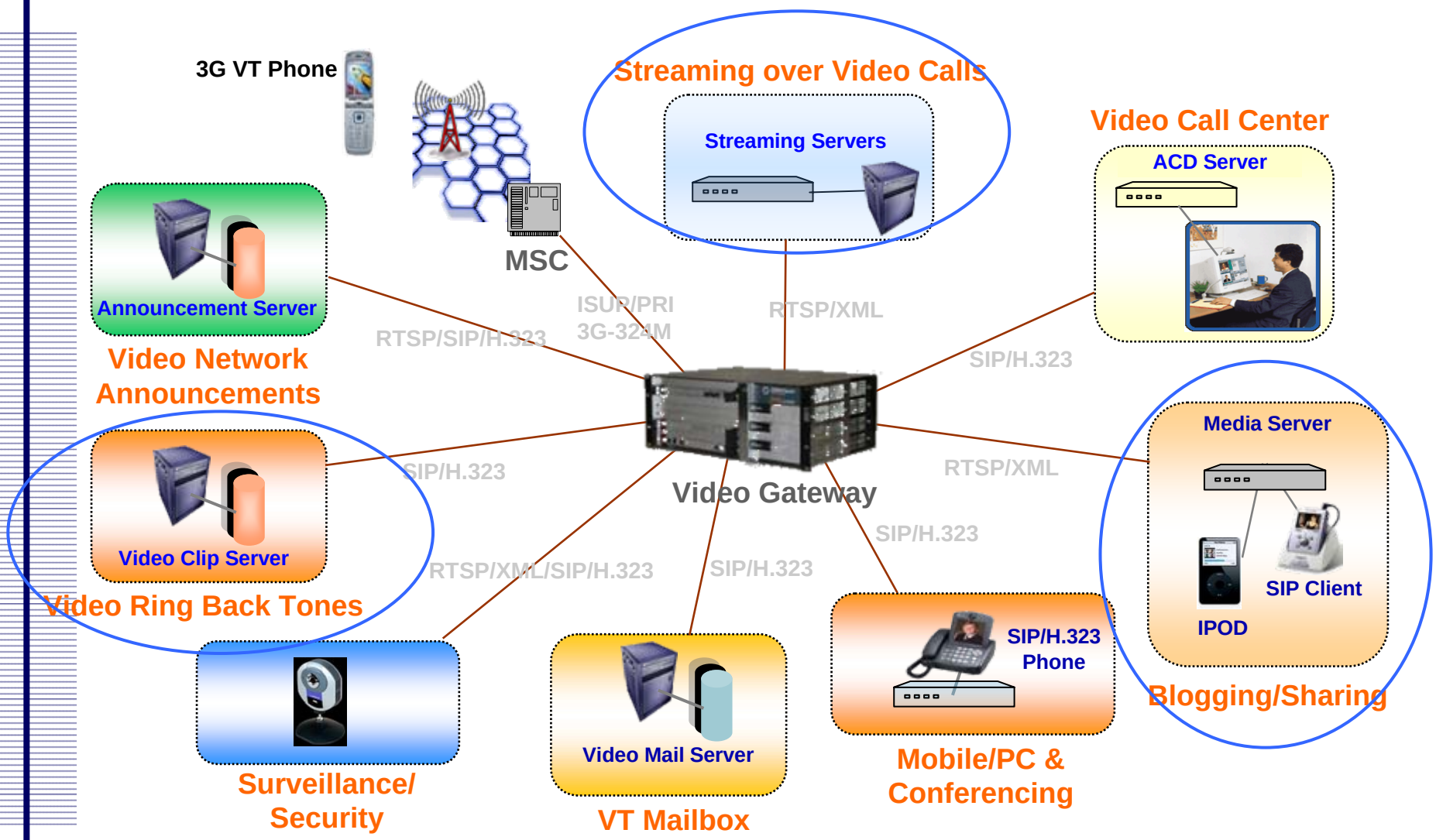
3G / Broadband Video / Multimedia Services



Conversational & Non-Conversational multimedia communications

	Conversational Services	Non-conversational service
End-to-end delays	< 400ms	One second or more
Guaranteed Throughput	Yes	Not always
Audio / Video quality	As best as possible	As best as possible
Audio / Video Lip Synch	< 100ms	< 100ms
Protocols / Apps	3G-324M, videotelephony, Conferencing, Streaming over CS, Video Ring Back Tones, Video Surveillance, …	SMS / MMS, PSS, Push to Talk, See What I see

The killer 3G video environment



Current trends in enhanced 3G video services

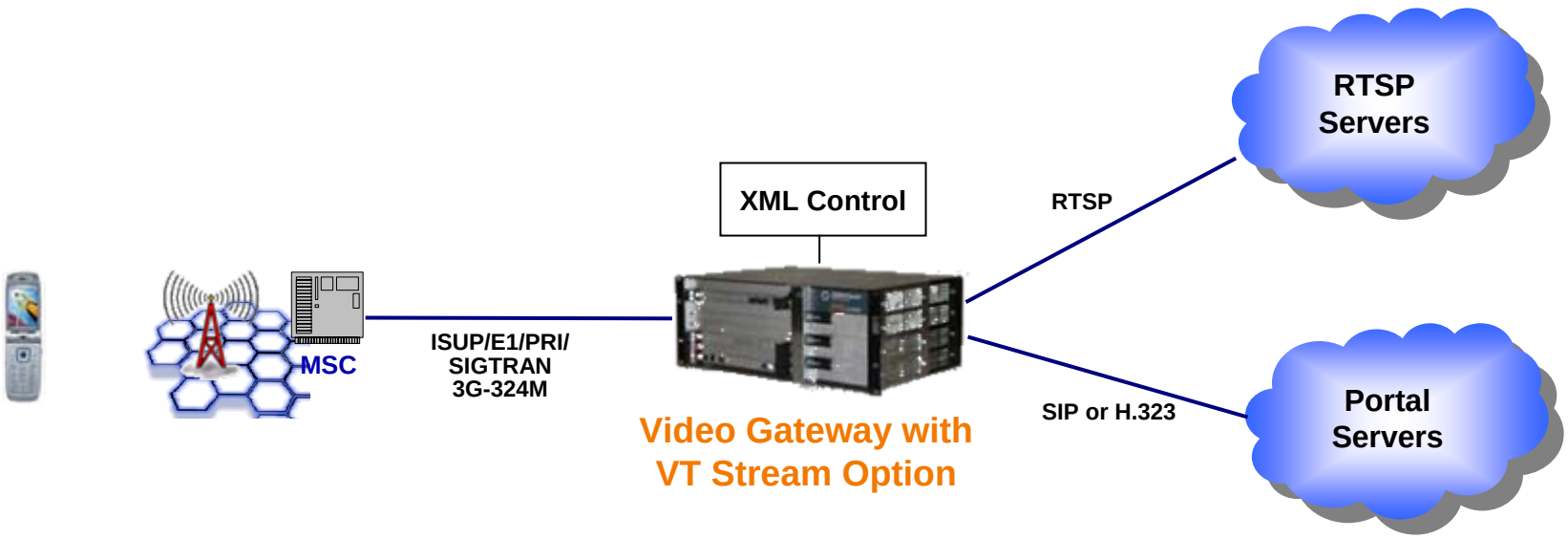
- **Most operators prefers video gateway as part of core infrastructure servicing *all* applications.**
  - → Lower CAPEX and OPEX as traffic grow
  - → Superior scalability and higher availability in a load-sharing or active standby configuration
  - → Consistent customer experience and services
  - → Streamlined Fixed/Mobile Connectivity
  - → Open standards based protocols (H.323, SIP and RTSP)
  - → Faster roll-out of new features across all services, and significantly lower cost in introduction of new codec technologies (e.g. H.264)
  - → Better fit with 3GPP architecture evolution (3GPP Release 4+ and IMS)
  - → A gateway as part of core infrastructure provides a universal port support for ***all*** enhanced video services.

Streaming over Video Calls w/DTMF Control

- **Streaming over video calls with rapid remote control (DTMF) is gaining significant momentum as a service complementary to PSS and HSDPA.**
  - → Much easier user interface. User dials a number or a short-code. Minimal "clicks".
  - → Simpler to deploy from technical and business-model perspectives. No walled/open garden issues; no firewall issues;
  - → Guaranteed QoS.
  - → Complementary to PSS/HSDPA.
- **Services include "Dial a video clip", "Stream-and-chat", "Location-based info-access", etc…**
- **Deployments by operators and service providers, including content aggregators.**

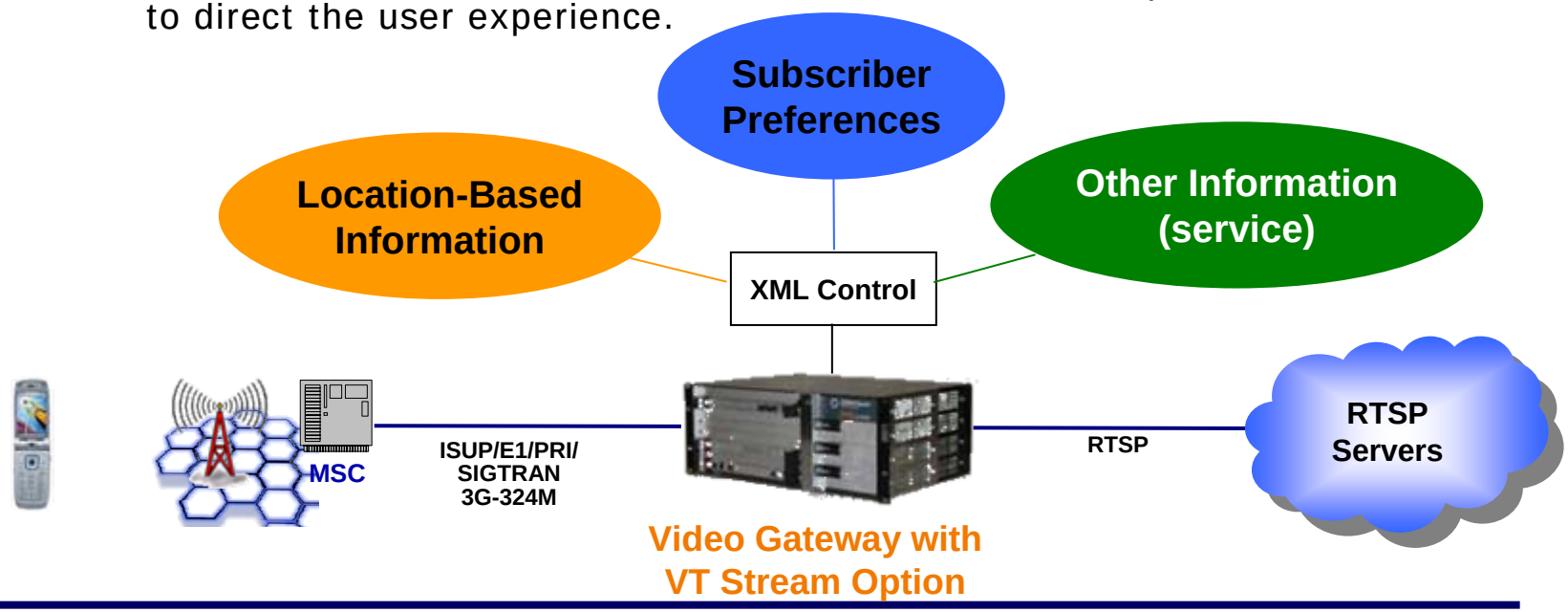
Circuit Switched Streaming Interfacing Options

- **The Video Gateway platform should provide flexible interfacing schemes to content servers:**
  - → RTSP Interface: Native RTSP support which runs simultaneously with SIP and H.323 (so a single gateway can be used for multiple services). An XML interface to provision CS Streaming services. The XML interface can be used to define the service and the user experience (mappings of DTMF keys) such as Play/Pause/FW/RW.
  - → SIP/H.323: SIP and H.323 interfaces can also be used by Portals/Servers if they desire to control the content interfaces directly.



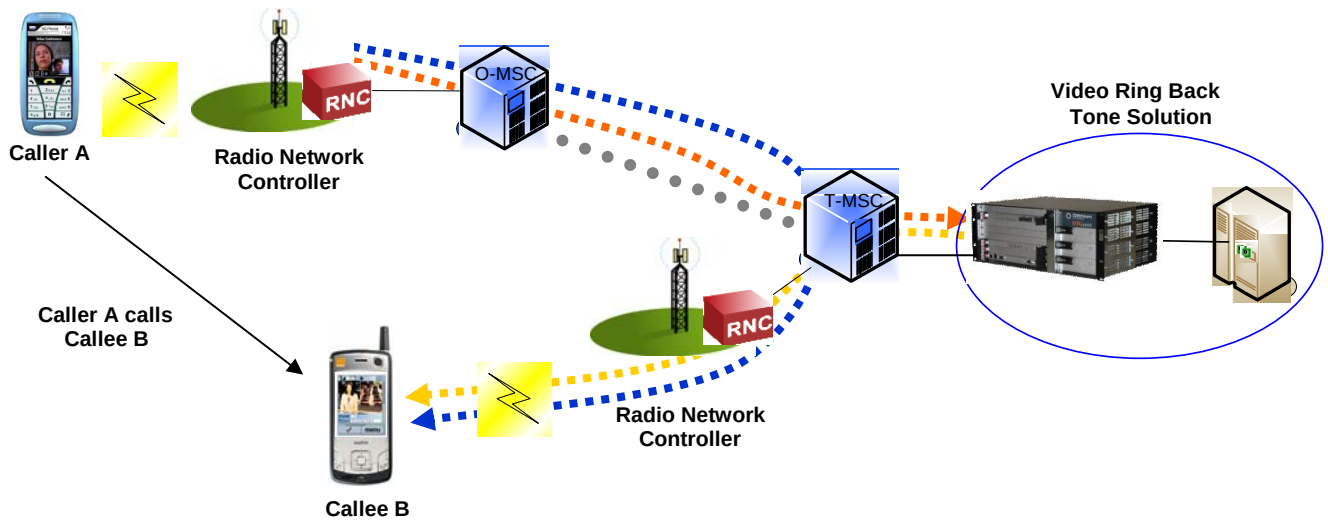
How service providers can differentiate

- **VT Stream XML interface enables operators and partners to differentiate, and rapidly provision advanced person ⇔ machine services:**
  - → Static use scenarios – mapping of MSISDN numbers to URLs include prompts, menus and key maps.
  - → Dynamic use scenarios where location and custom information can be used to direct the user experience.
  - → Personalised use scenarios where user information and preferences can be used to direct the user experience.



How Video Ringback Tone Works

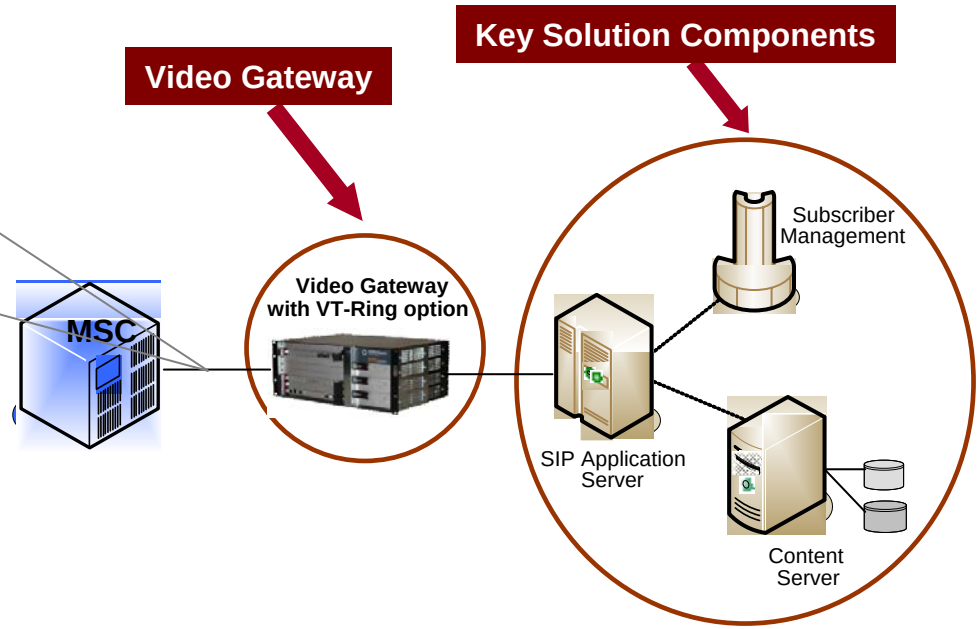
- **Caller A places a video call to Called party B.**
- **If Called party B has video ring back tone service, call is off-loaded to the video ring back tone system**
  - → Video clip is played back to the Caller-A
  - → Second call is established to the Called party B
  - → Calls are joined together when B answers
  - → Billing and end-to-end session establishment are important considerations.



Video Ring Back (VT-Ring) Complete Solution

The VT-Ring solution provides the ability to provide video overlay and mixing for enhanced services such as Avatars

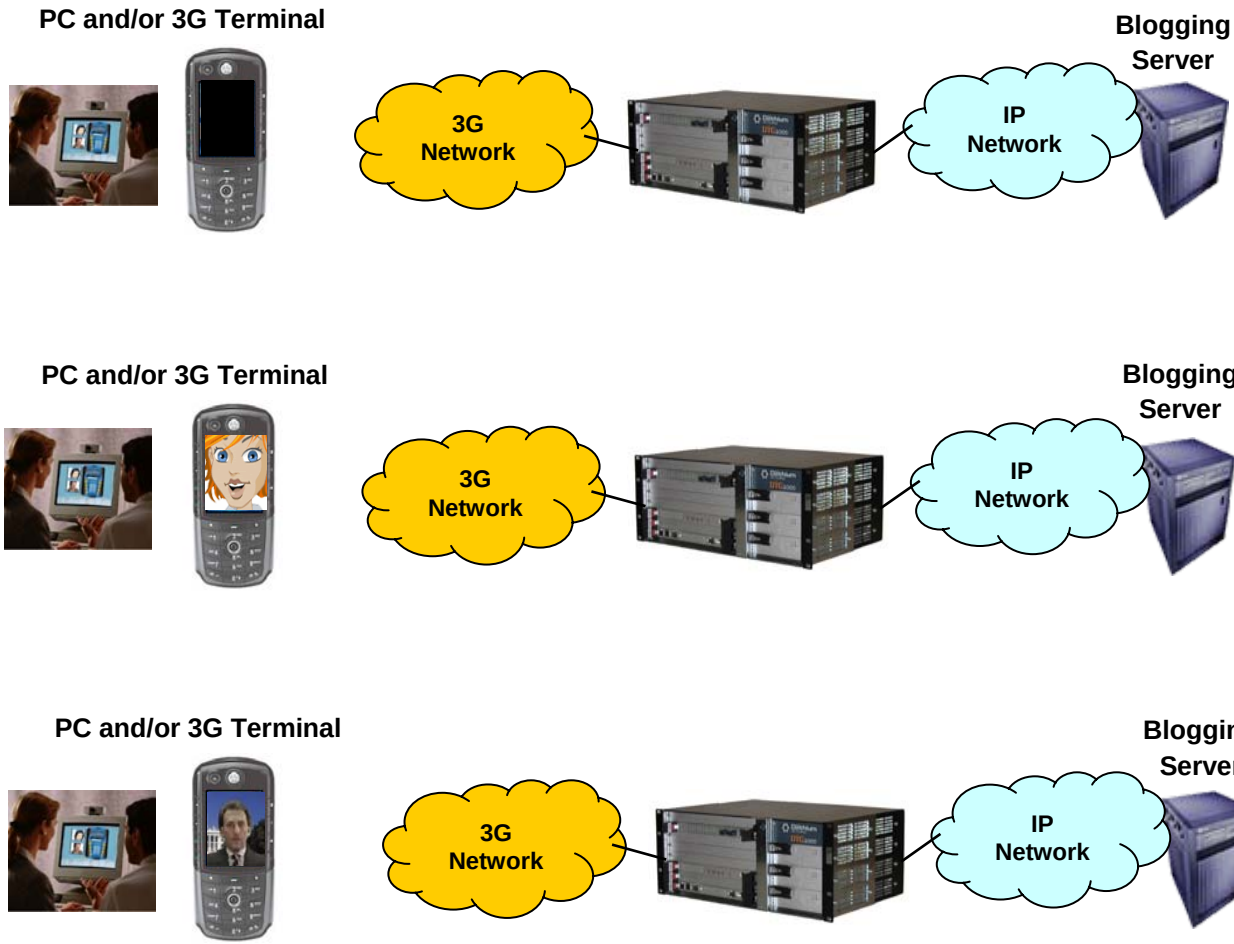
Requirement to work with MSC and terminal vendors on interfacing issues in particular billing and end-to-end session establishment.



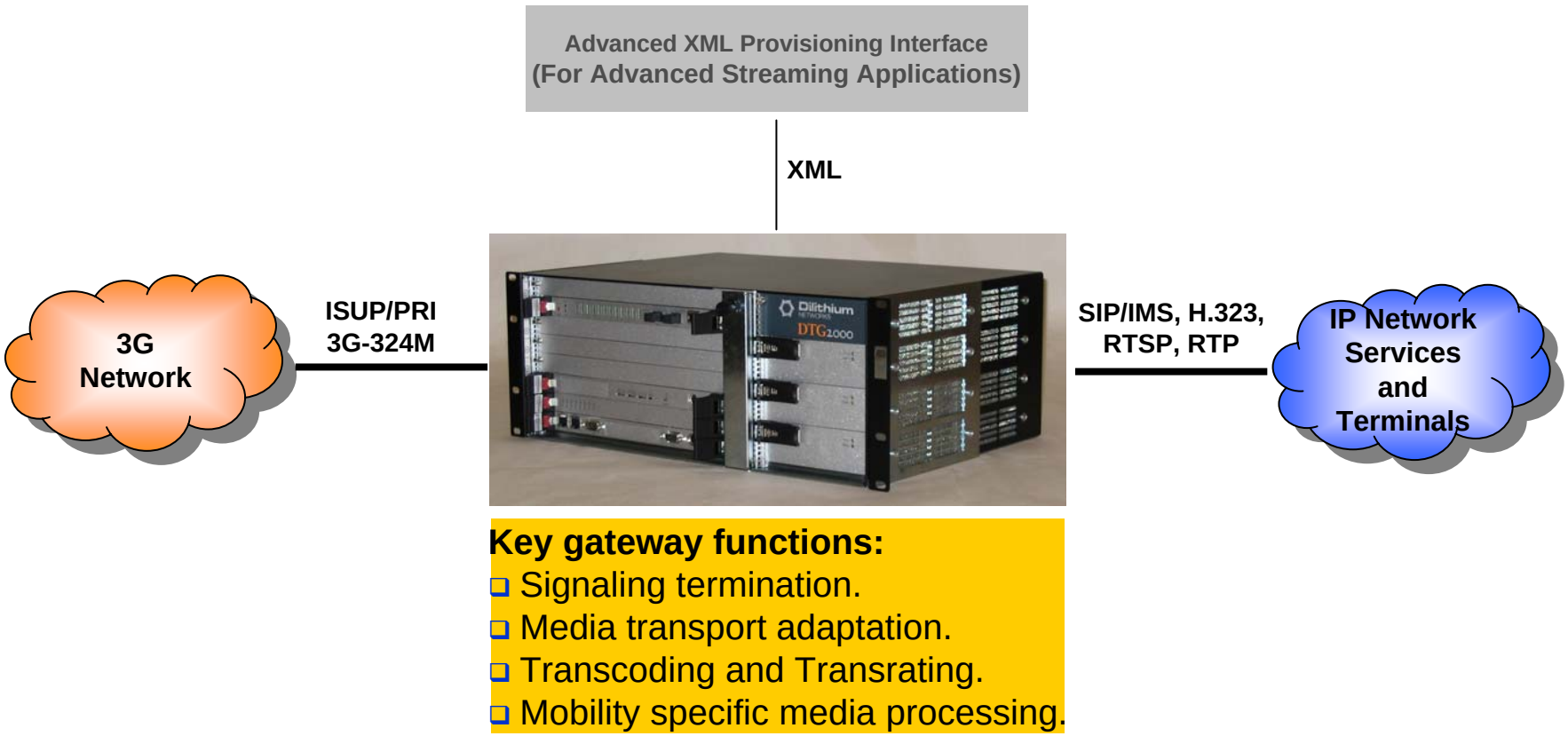
Key aspects to consider in Video Ring Back Tones

- **Session setup time needs to be as short as possible.**
  - → Only H.324M session setup issue, but also session processing in gateway (between 3G-324M termination and server).
- **Mobile specific issues of video corruption. Audio Ring Back tones experience show during of clip play is about 8-9 seconds. Video corruption can last 5 seconds on average ⇒ essential to deal with video corruption.**
- **Media quality (video quality, delays and lip-synch)**
- **Interworking between Mobile and Fixed terminals (SIP/IMS).**
- **Service evolution:**
  - → Interworking of intra-generation and inter-generation handsets.
  - → Video codecs (H.263, MPEG4-part2) and H.264.
  - → Voice codecs (narrow-band and wide-band AMR).
  - → Clip format (codec and bitrate) and storage (operator defined – User defined).
- **Solution evolution with 3GPP architectural evolution (3GPP Release 5+, Soft-MSC and IMS).**

Multi-Access Video Blogging (VT-Exchange)



Interfaces of 3G Multimedia Gateways



Key gateway functions:

- Signaling termination.
- Media transport adaptation.
- Transcoding and Transrating.
- Mobility specific media processing.

Customer Experience is Everything

- **Regardless whether circuit-switched or packet switched, customers of converged networks face a number of quality experience issues:**

  - → Video corruption on air interface
  - → Video quality
  - → End-to-end delays
  - → Video/audio lip-synch
  - → Video session start-up time

The issues can be the handset, network infrastructure, or their interaction

Addressing customer experience issues

Media transmission delays and synchronization for connectivity of networks and devices	Call setup delays for both customer terminals and Enhanced Services	Video corruption in Messaging, Streaming and Push services	Video and audio losses, and glitches during call switching in personalized video ring back, announcements, and other applications
Unicoding™	**AnswerFast™ Suite**	**Video Refresh™**	**Video Ring™**

Operators view solving these customer experience challenges as key requirements for wide adoption of video services

Video Corruption - The Problem

- **Example: Subscribers retrieving their videomail or receiving a Video Ring Back clip may see seriously corrupt video for up to 10 seconds (5 seconds on average).**
  - → Reference I frames are normally 130 frames apart, at 13fps this is equivalent to one every 10 seconds
  - → If bitstream corruption occurs without any fast update scheme it could mean up to 10 -13 seconds before a clear image is visible

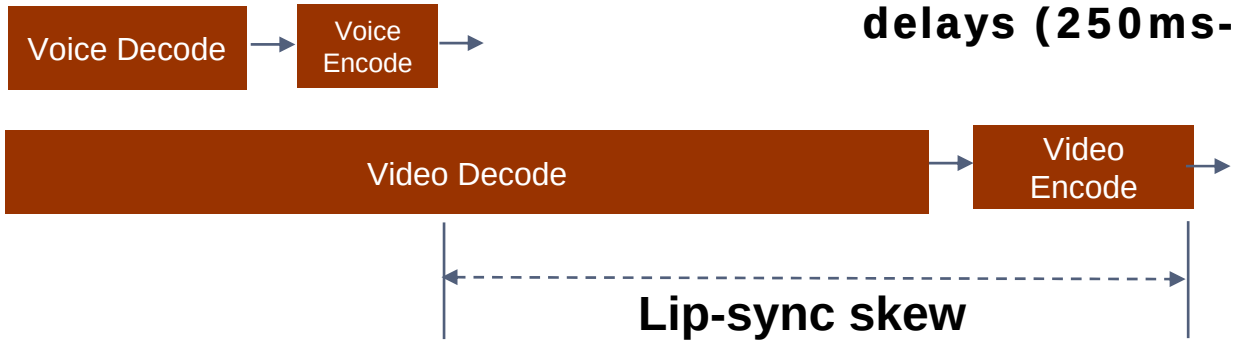
Video Corruption –Video Refresh™ Solution

1. **Detects bitstream errors from remote terminals and request a key frame to be generated**
2. **Responds to Key frame requests by generating on the fly a Key Frame and automatically updating P frames until next Key frame is received from server**
3. **Video Refresh allows recovery from video corruption in about 200-500ms.**
4. **Video frame rate still dynamic and is not permanently reduced.**

Video Refresh operates in pass-through and in transcoding modes

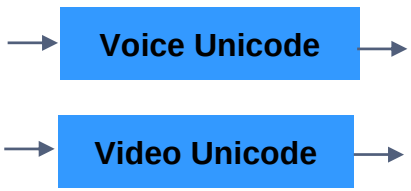
Unicoding Benefits – Minimal Delays and Maximal Lip-Synch

Tandem Transcoding



Tandem transcoding introduces large lip-sync delays (250ms-400ms)

Unicoding



Very low voice and video delays reducing lip-sync latency problems.

Customer experiences: (1) Minimal delays and (2) optimal lip-synch

AnswerFast™ Technology Suite

- **The AnswerFast™ suite of patent-pending technologies underpins the proposal (MONA) that ITU-T and 3GPP are finalising.**
- **The AnswerFast™ *Plus technology in MONA,* allows terminals to exchange audio and video within 1 sec of bearer availability. Comparable to voice calls.**
- **Presently licensed to 4 terminal vendors and 2 chipset suppliers including:**
  - Including Motorola; Datang Mobile; High Tech Computer, Samsung
  - Final stages with a number of chip-set and handset vendors

Advanced technologies and services

ENABLING TECHNOLOGY

→ Ubiquitous Access

3G/4G Mobile Networks and WiMAX/WiPRO, with CATV/DSL/FTTx broadband penetration

→ IP-Multimedia Subsystem (IMS)

Deployment of full-fledged IMS networks that allow rapid service delivery including presence

→ Mobile & Home Devices/Terminals

Multimode devices with advancements in computing power, memory, media processing

→ Enhanced Security Systems

Reliable security authentication, (inc. DRM) aspects of a converged network & terminals

→ Advanced Video/Voice Technologies

Advanced audio (music), voice, and video compression & communication technologies

ADVANCED CONVERGED SERVICES

→ Person-to-Person Video Comms

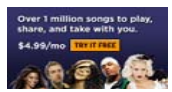
Media rich video communication on any network at any time, home or away

→ Converged Access

Access to personalised, customised information that is global, local and community based

→ Infotainment

Entertainment that is tailored towards location, demographics, and life-style etc.



→ Mobile Professional

Enabling enterprises and mobile vertical professionals to work wherever, whenever.

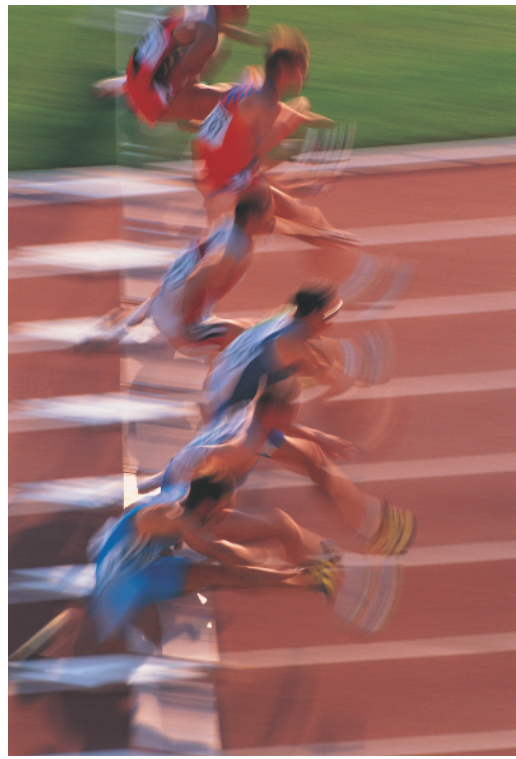
→ Virtual Life …

The increased use of avatars, virtual assistants, etc to enhance personal quality of life

These technologies will enable advanced converged multimedia services & applications

Summary

- **3G and Broadband networks are continuing to grow and consumers have stated their preference for innovative/simple video services**
- **There are a large number of key video applications and services enabled by the networks**
- **Solving the quality of the customer experience is key to subscriber take-up and volume of convergent multimedia services**



Key applications such as Video Streaming, Video Blogging and Video Ringback Tones can be enabled over wireline/wireless/WiFi networks with quality of service requirements