

CARNet Video Network

**Towards a modern multimedia
infrastructure**

Few words about us

- CARNet stated “doing” multimedia in 1994
- 2nd wave came in 1998 with high-bandwidth streaming applications and ATM VC
- 3rd wave came in 2000 with CARNet Media on Demand project and Room VC services
- 4th wave is emerging – rethinking of entire concept of multimedia and building every piece of the puzzle

Note on the authors

➤ Zvonimir Zelenika

- doing multimedia in CARNet since 1996
- ATM VC, streaming, solutions development
- now acting as a research advisor

➤ Robert Maček

- joining our multimedia effort in 2001
- development of streaming solutions
- running around $\frac{3}{4}$ insane these days

Multimedia infrastructure

- A synergic total of all hardware, software, knowledge and organizational elements required for development and deployment of multimedia services
- basically, we got lost in “doing” multimedia, so we got back to basics and started thinking up **ALL THAT WE NEED** to provide some cool and nifty multimedia stuff

What stuff ?

- What **IS** and what **IS NOT** multimedia ?
- What are building **BLOCKS** of the puzzle ?
- What **ARE** we ?
- How to **TALK** to network people ?
- How to understand **ART** folks ?
- How to **ORGANIZE** ourselves ?
- What do we outsource to **PARTNERS** ?

Therefore, the MM infra

- With the next-generation CARNet network (GiCa – Gigabit CARNet) we envision new multimedia on three identifiable layers:



Multimedia network

- KISS: Bandwidth (lots of it) & Multicast
- CARNet has ATM backbone since 1995
- eight years – no multicast (one sad story)
- New GB backbone coming – **GiCa Network**
- With multicast and all those nice and flashy **TLA** and **FFLA** (IPv6, RSVP, etc.)
- Multidisciplinary approach is bringing results, multimedia and network people **ARE TALKING**

Multimedia services I

- **Those easy to spot (groovy hardware)**
- **Archive:** 300GB archive with XML metadata
- **Servers:** supporting WM/RM/QT/MPEG
- **Production:** several $\frac{3}{4}$ professional systems
- **VC rooms:** H.323/ATM "TCR" rooms
- **VC infra:** H.323 GW/GK/GDS/MCU/Desktop

Multimedia services II

- **Not so easy to spot, but still important**
- **Consulting:** helping other content-creation and application development centers
- **Knowledge base:** Archive of various documents about multimedia
- **Training:** Through our education program: **EduPoint** (MM usage courses)
- **Funding:** Giving away free stuff and funds

Multimedia applications

- **Visible manifestations, eternal quartet**
- **Videoconferencing:** Desktop to room high-quality systems (various levels)
- **On demand:** Archived content provided (education & training, entertainment)
- **CARNet TV:** 3x24x7 broadcast
- **Live coverage:** Several webcast teams with all tidbits ready to cover anything

Multimedia applications (revisited)

- Creating integrated media interfaces for various types of content
 - integrated multimedia educational content
 - conference live coverage (such as this one)
 - interfacing media archive in various ways
- Lots of programming and very diverse portfolio of knowledge required
- Need of strong multidisciplinary team

Some general conclusions

- **YOU JUST MIGHT BE THINKING**
- Just a bunch of wishful thinking
- You're thinking "I could have thought of this"
- What are these guys actually about?
- Hot water was invented at last years' TNC
- We want our money back !

Here they are (the conclusions)

- **Segmenting helps** – define the bits and solve them one at the time , no big projects as they drag too much over time
- **Have metrics** – however stupid they are (GBs of files, server traffic, # of people bothering you, % of usage of VC equipment)
- **Have a plan** – compare the metrics over time, however unhelpful they seem

Some more (conclusions)

- **Talk to network people** – it's hard as they don't get out much, but it helps
- **Talk to content creators** – artists are totally unorganized and lost in space & time
- **Expect the failures** – things like 2 people watching the live stream or noone looking at some content for months
- **Expect and accept the sleepless nights**

TF-STREAM list clarifications

- This should stirr things up
- Why are we using **Windows Media**?
- We know we're sacrificing part of users (GNU/Linux and other unix until WM for linux)
- We did try virtually everything else:
 - Apple QuickTime DSS, RealMedia (bit of Helix), Icecast/ogg, StreamWorks MPEG-1
 - Had some chances with Kassena & Digital Fountain

Windows Media Series 9

- MS is becoming more and more standard (RTSP, SMIL, MP3 support, XML-a-lot, MPEG-4)
- Very good codecs (as of version 8)
- Good tools (encoders, players, editors)
- Excellent server platform (Server 2003)
- Strong development tools and platform – Player, Services, Format SDKs
- Supports any **.NET** language

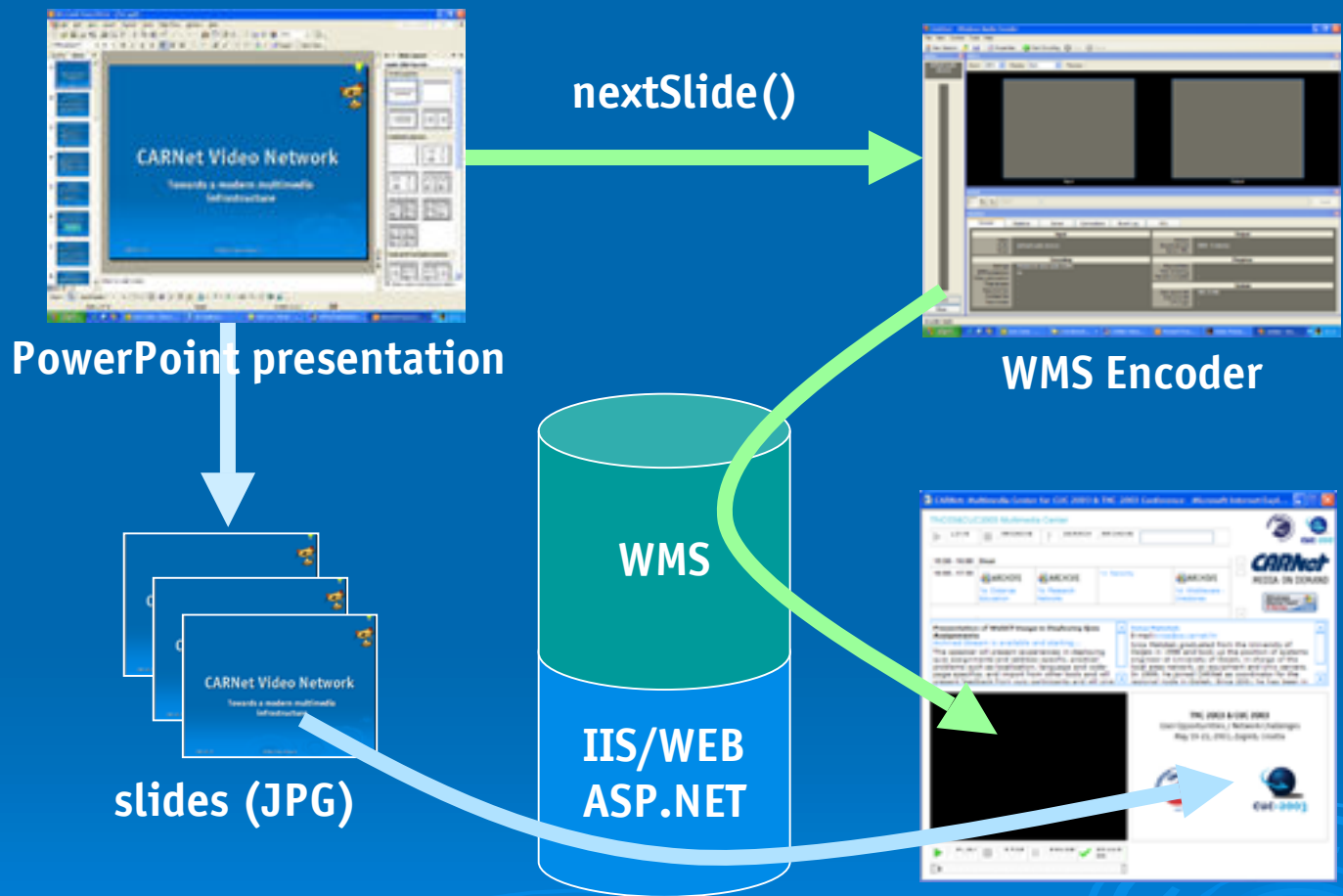
TNC 03 / CUC 2003 Streaming

- Short description of our effort here
- 4 encoders covering all sessions
- Synchronising presentation slides with the streams (live and archived)
- WMS Series 9 platform, support from WMP 7
- Ads and jingles in between sessions
- Few hour delay for archiving content

TNC 03 / CUC 2003 Streaming

- Had some blunders with sound and slides
- Those responsible have been shot
- Database is holding by a thread
- ASP.NET code has hard-coded bits
- Robert is between $\frac{1}{2}$ and $\frac{3}{4}$ mad
- Robert has killed a fox on a way home at 3AM
- Zlatko (head of parade) will kill us anyways

How it works ?



How it works ?

- PowerPoint saves a slide as a JPEG on the server and notifies the WM Encoder on another computer which inserts the script event into the stream
- On player side we interpret the script event from the stream and simply pull the slide image from the web server
- Session information is stored in a database

Did it work ?

- Worked fine for most of the time
- Had few sound blunders and some sessions are missing slides (responsible have been shot)
- US Federal eAuthentication lecture has garbled sound in the archive due to Homeland Security Ministry action :o)
- But more-or-less, it's a **success**

Usage statistics (as of 1hr ago)

- We had max 62 simultaneous users streaming total of 42Mbps (streams are max 300kbps, but WMS does faststart buffering), usually around 40-50 simultaneous users
- As of 1hr ago: 650 distinct IPs transferring total of 61GB of data (500 hours at top quality)
- Already 4GB of content from archive

Summary

- We think we're doing **good** multimedia
- Organizational framework makes sense
- Technical teams are sometimes insufficient
- We rely on student researchers a lot
- Integrated media interfaces (API)

- Network multimedia has become much more than just video and audio

Q and A