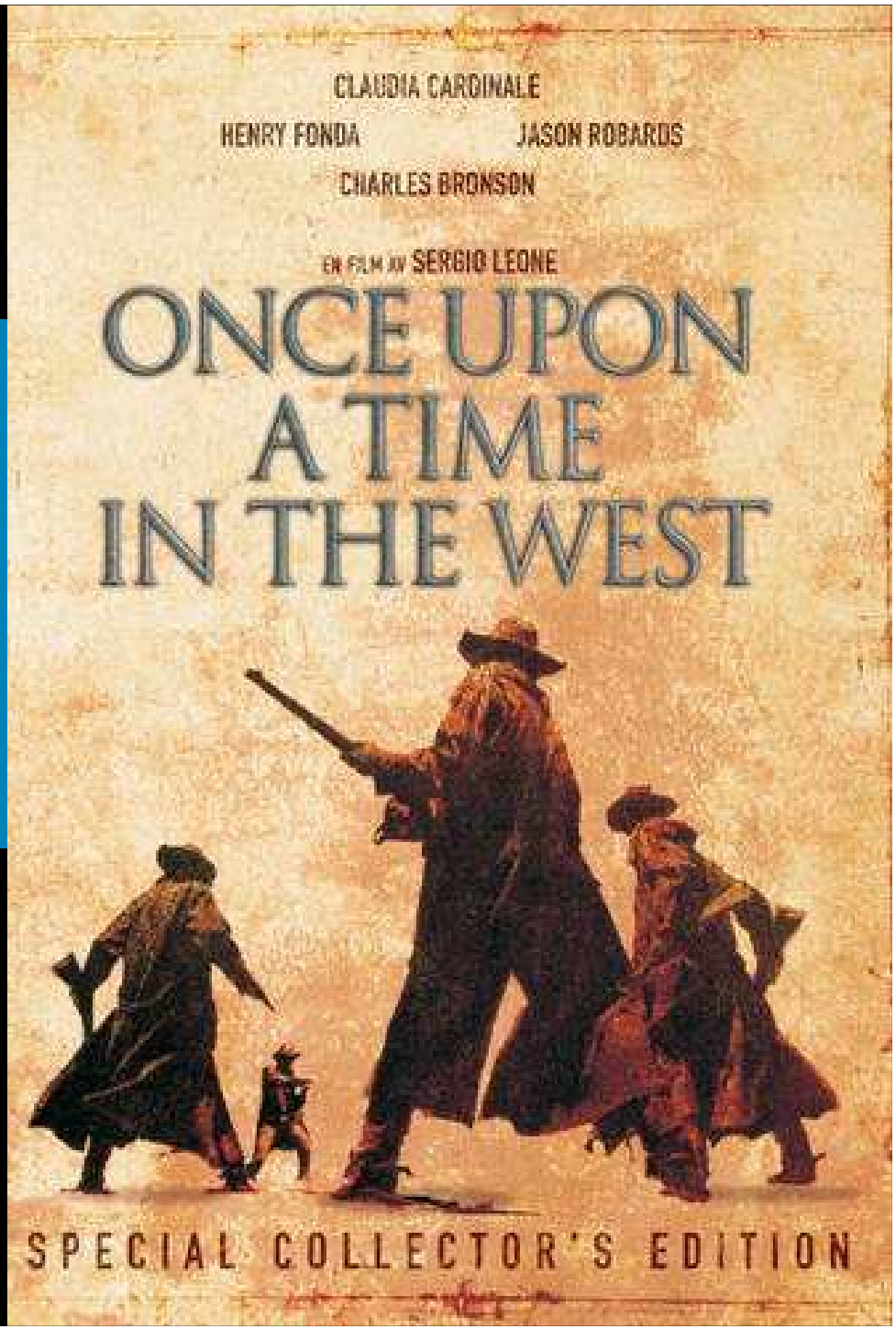
Video

Arne Martin Skyrud, SE

Cisco Systems



Det Norske Broadcast TV-markedet

- 49% Kabel-TV
- 27% Satelitt
- 10% Analogt Bakkenett
- 8% IP-TV
- 2% Mobil-TV !!

Det Norske Broadcast TV-markedet

- 6 av 10 TV-kunder fornøyd med tjenesten.
- 9 av 10 Bredbåndskunder fornøyd med tjenesten.

- ”Die Hards”: 7% sier de vil fortsette med Analogt bakkenett selv etter at det stenges ned !!

- Lyse har 50% av IP-TV markedet ??
- NGT har 6%
- Hafslund har 3%
- ”Andre” 36% (Mange av disse er nok Altibox).

Hva med innholdet, hvor sees hva ??

- Kringkastet: Nyheter
- Web-TV: Underholdning og Brukergenerert
- Mobil-TV: Sport, ”lav-kvalitet underholdning”

- Hva med Mobil-TV ??

IPTV and Video Services

IPTV = IP network delivered TeleVision

Today it usually includes:

- Switched Digital Broadcast channels (SDB)
- Video-on-Demand services (VOD)
- Digital Video Recorder services (DVR/PVR)

Broadband IP Access Network

Today: xDSL, Cable Modem, FTTx, Metro Ethernet,
Future?: 3G, WiMax, BPL, ...

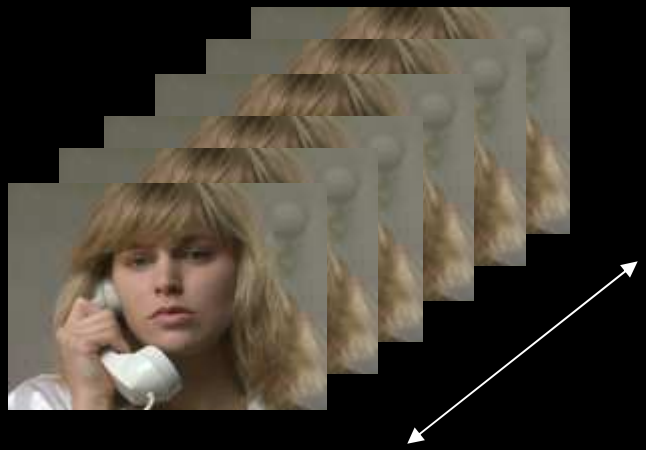
Subscriber

IP-STB (Set Top Box)

Analog or Digital TV (increasingly HDTV)

What is video

- In order to provide moving pictures a sequence of images are required to be displayed. These individual images are known as “Frames” or pictures
- Flick through the pictures at a fast enough rate and we have motion.



Video broadcasting network hierarchy

- Contribution: Uncompressed and slightly compressed video and audio sources from remote location or studio to studio
- Primary distribution: Compressed A/V sources from the Playout Center to the video head-end, transmission tower or satellite uplink
- Access distribution: Compressed A/V sources from the satellite downlink, transmission tower or IPTV/cable video head-end to the subscriber

Our focus

IPTV = Compressed Video

- Uncompressed Digital Video in the SDI (Synchronous Digital Interface) format requires a tremendous amount of bandwidth to transmit

  270Mbps for Standard Definition Service (SD)

  1.485Gbps for High Definition Service (HD)

- Compression is required in order to
  - deliver video services over broadband IP networks
  - reduce the storage space requirements for VOD systems
- Defined by international bodies such as the Moving Picture Experts Group (MPEG)

MPEG-2 Video Encoding Basics

I Frames - Intra-coded only - reference frame for future predictions.

- Spatial Redundancy is eliminated using technique such as DCT (Discrete Cosine Transform)

  Moderate compression (on order of 10:1), limits the propagation of transmission of errors, supports random access and fast forward/fast reverse.

- Temporal Redundancy eliminated using motion compensation, prediction and delta frame transmission

  P Frames

  Forward prediction from either previous I frames or previous P frames. Reference for future P or B frames. Good compression savings (20:1).

  B Frames

  Bi-directional interpolated prediction from two sources. Previous reference I or P frames (forward prediction).Future reference I or P frames (backwards prediction). Highest compression (50:1).

Cisco IPTV Head End Products
Summary — Complete Product Portfolio

Video Acquisition

Satellite/Off-Air Receivers,

IRDs, Descramblers, etc.

Titan MK II QPSK Receiver

Atlas MK II OFDM Receiver

Indus MK II: Descrambler

IRD: 9850

Video Processing

Transrating, Multiplexing

Splicing, Content Insertion

DCM: Digital Content Manager

Video Encoding

MPEG2 and MPEG4

Standard and High Definition

D9032 SD: MPEG2 SD

D9050 HD: MPEG2 HD

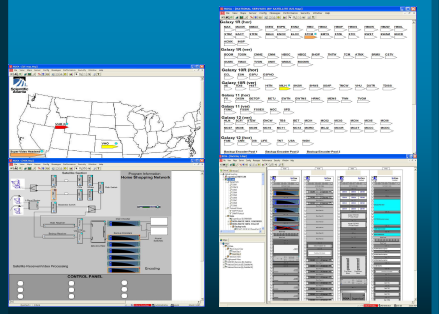
D9034 SDTV: MPEG4 SD

D9054 HDTV: MPEG4 HD

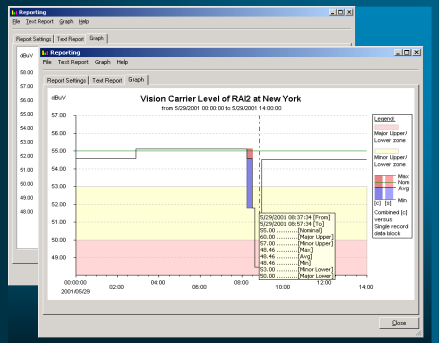
Video Management

Single point of control

Lights – out Operation



ROSA: Management



ROSA: Reports

Complete Family of IP Set-tops

North America and Worldwide

Key Features

- System on chip (SOC)
- MPEG-2, MPEG-4, VC1
- WinCE or Linux OS
- Options for Middleware and CA/DRM
- HTML, Java, Javascript, uPnP, TCP/IP, RTP, RTSP, etc.
- NTSC and PAL
- IP Over Coax
- Hybrid IP/RF Models

Single Stream SD
IPN330SD

- Single SD decode

Single Stream HD
IPN330HD

- Single SD or HD decode

Single Stream HD+RF
IPN601G

- Single SD or HD decode
- 2rd RF output for remote TV

Single Stream DVR
IPN430MC

- Single SD or HD decode
- DVR (80+ GB HDD)
- Whole house server

3 Stream DVR Gateway
IPN603MCG

- One set-top for the entire home (3 decoders-in-one)
- HD to primary TV
- Two SD/RF outputs to multiple secondary TVs
- DVR (80+ GB HDD)

The Middleware …

- Revenue producing IPTV services
  - Tiered Broadcast TV
  - Program Guide
  - DVR, VOD, PPV, etc.
- Interoperability of system components
  - STB, CAS, VOD, BSS/OSS, etc.
- Compelling GUI for presenting rich media to consumer
- Differentiation for service provider

ISDP: Major Components

- ISDS Server
  - ISDS Server software
  - ISDS Server hardware
- ISDP Client (STB) Software
  - ISDP Client software
  - Optional: Services Layer software (ANT Galio)
  - Optional: Reference User Interface (TV Navigator, EPG, VOD, DVR, Settings)
  - Optional: Cisco/S-A CA/DRM
- Plus, Other Key Cisco / S-A IPTV Products and Services
  - VQE
  - Encoders, DCM and other video headend products
  - Cisco CDS (Content Delivery System)

VQE (Visual Quality Experience)

- Consists of a server-side component (VQE-S) and a client-side component (VQE-C)
- Error Repair for lossy access media
- Channel Change Acceleration for H.264/AVC video streams with large GOP sizes*
- Quality of Experience Monitoring for detailed, video-specific error reports

*VQE will work with both MPEG-2 and MPEG-4 video streams

IP NGN Carrier Ethernet
Visual Quality of Experience

Intelligent

Without VQE: Distortion at 1% packet loss

DSLAM

Alternative Solution

10x Better Video Performance over DSL

With VQE: Perfect video quality at 10% packet loss

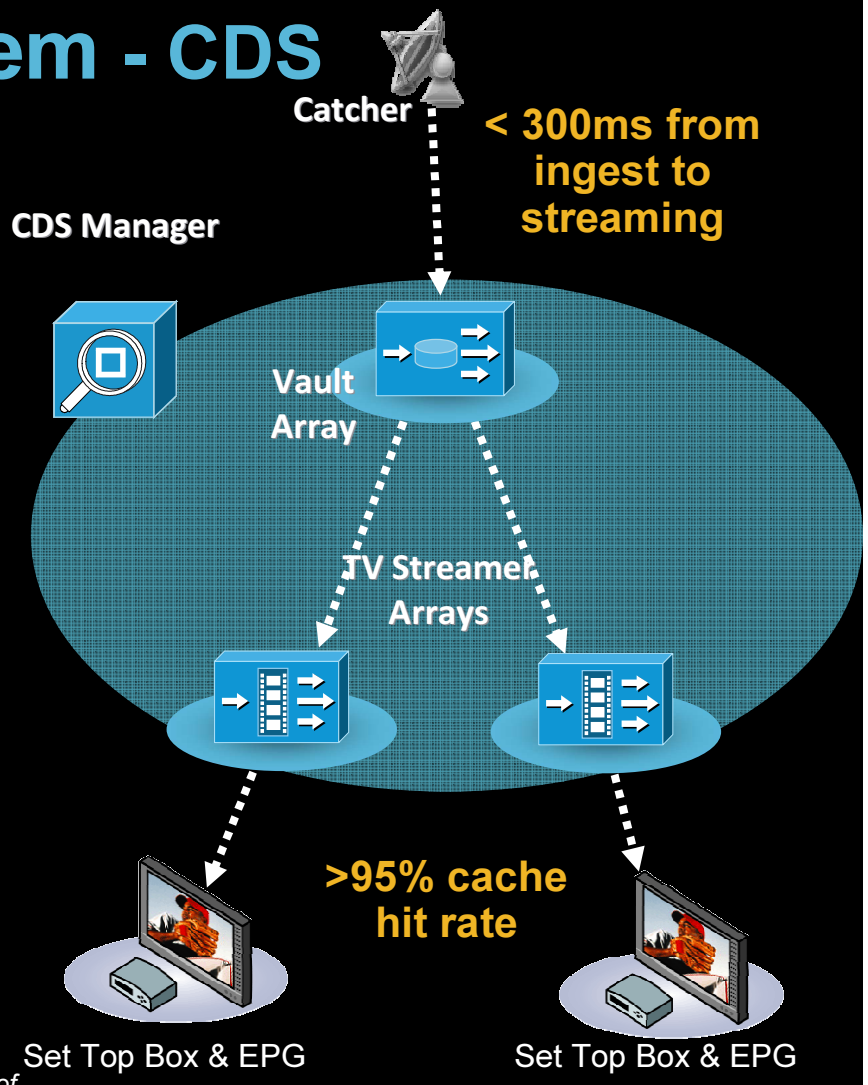
DSLAM

VQE

Cisco VoD Solution
Content Delivery System - CDS

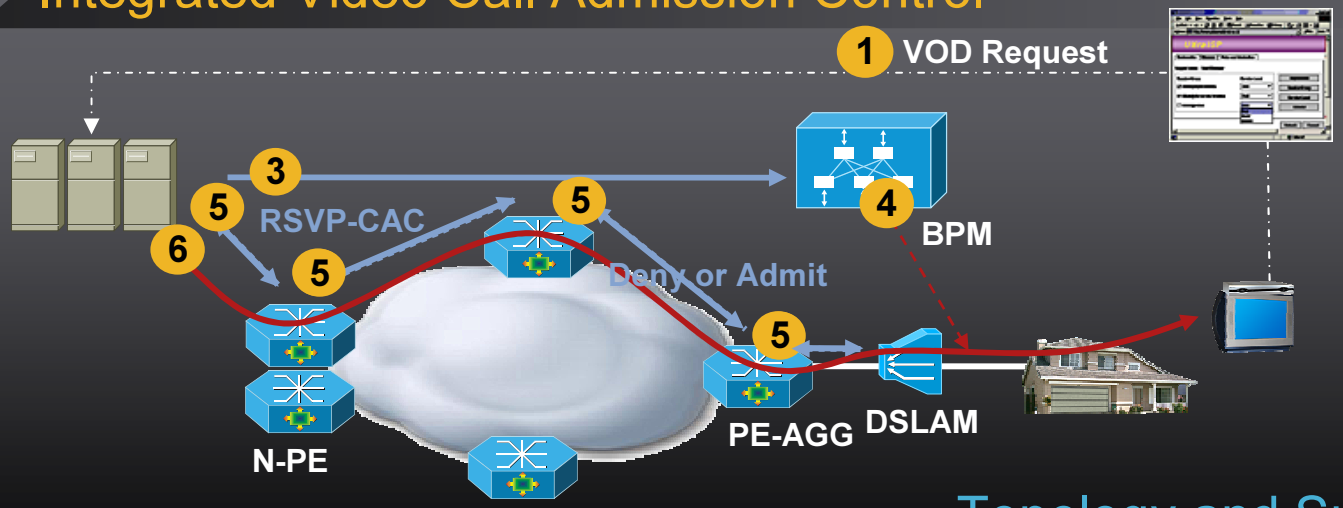
- **"The network is the platform"**
  - Internet proven approach
  - Web "2.0" is already there
- **Flexible architecture**
  - Distributed, centralized or hybrid
  - Hierarchical network storage
  - Streaming at the network edge
  - Multi tier cache
  - Massively scalable
- **CDS Applications**
  - **Vault** - Ingest & reliable storage of media
  - **TV Streamer** – Media personalization
  - **ISV** – Vault and TV Streamer on one appliance
  - **TV PlayOut** – scheduled & looped play out
  - **CDS Manager** – Element Manager

Note: CDS Manager not in session control path and is not a single point of failure.



Protect against network oversubscription with RSVP - CAC

Integrated Video Call Admission Control



Winner Broadband World Forum October 2006

Topology and Subscriber Aware

VoD RSVP CAC Key Points

- On Path Reservation (vs Off-Path)
- Deployable w or w/o BPM (use RSVP-Receiver-Proxy instead)
- Multicast RSVP CAC also available
- More details on the following slides

Traffic classes and network behavior

	DiffSrv DSCP	Prec	Behavior	Queuing	Other
Voice and voice signaling	EF	5	Low latency, High priority	Weighted queue	Police on exceeding weight
Video Broadcast	AF41	4	Assured forwarding, very low drop	Weighted queue	
Video on Demand	AF42	1	Assured forwarding, low drop		Drop on exceeding threshold
Video Signaling	CS3	3	Non oversubscribed class	Weighted queue	Police on exceeding weight
Internet Access	BE	0	Best effort	Weighted queue	WRED

Thresholds Will Cause VoD to Be Dropped Before Broadcast