
Harmonic
david.price@harmonicinc.com
david.price@mpegif.org

Some Tools for New Age Video

- Fast Channel Change Time
- CPE Middleware supporting
  - Third Generation PIP/Mosaic
  - VIM / Caller ID
  - Video Search Engine
- Control Plane that is more than element management
- Dynamic Rules Based Content Security
- Government requirements (must carry, VBI etc.)
- Affordable decoders, downloadable codecs
- Widest Coverage through High Efficiency Low Cost Encoding
- IP everywhere even in the Stat Mux
- Integrated (n)PVR for time shifted content

Channel Change Time

1. Proprietary IPTV d-Server transport wrapper

- Instant unicast channel change time (nPVR VOD)
- Fast channel change for multicast
- Instant channel change with ~17 secs of unicast while multicast catches up

2. Open IGMP based transport (RFC2887)

- Core network downside, all channels to all DSLAMs
- Scalable with predictable, acceptable channel change time
- due to RC5 IR protocol and key debounce in STB Button - 10ms
- convert to a leave/leave/join and passed to ADSL modem - 10ms
- ADSL modem interleaves upstream traffic and packetises - 50ms
- DSLAM de-interleaves and extracts packet - 50ms
- STB receives MPEG stream and waits for GOP to start picture display - up to 500ms by convention TS 154.
- TOTAL = 620ms
- IF YOU ADD: Remote authorization – ADD up to 1500ms
- IF YOU ADD: Unmodified IGMP Stack (i.e. no IGMP Snooping) - ADD up to 5000ms

What do you mean “Third Generation PIP/Mosaic” ?

1st Generation:

Analog composition at the head end

2nd Generation:

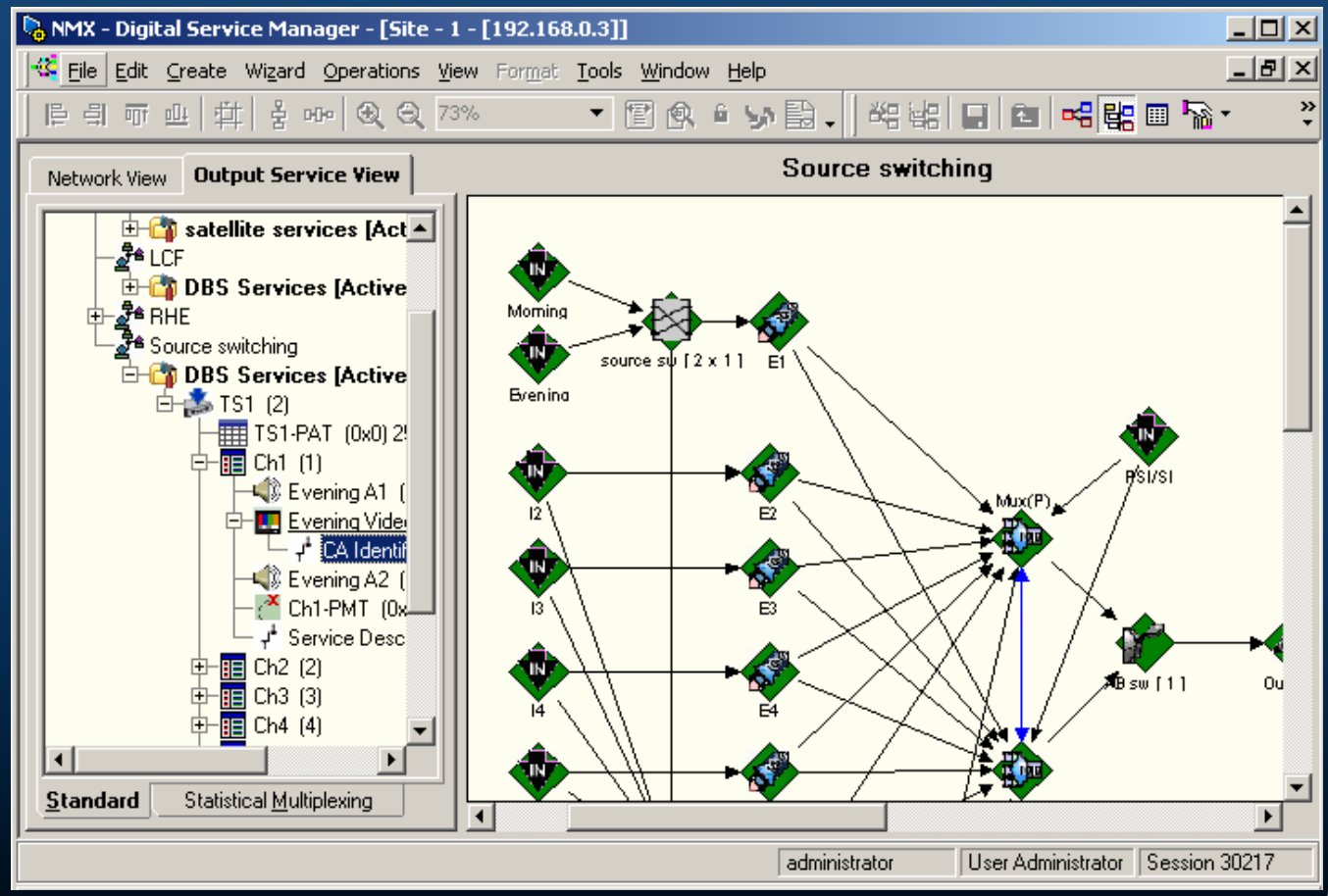
Digital composition at the head end

3rd Generation:

Digital composition at the CPE

- Favorite Lists
- A La Carte
- Parental Control

Scheduling Services



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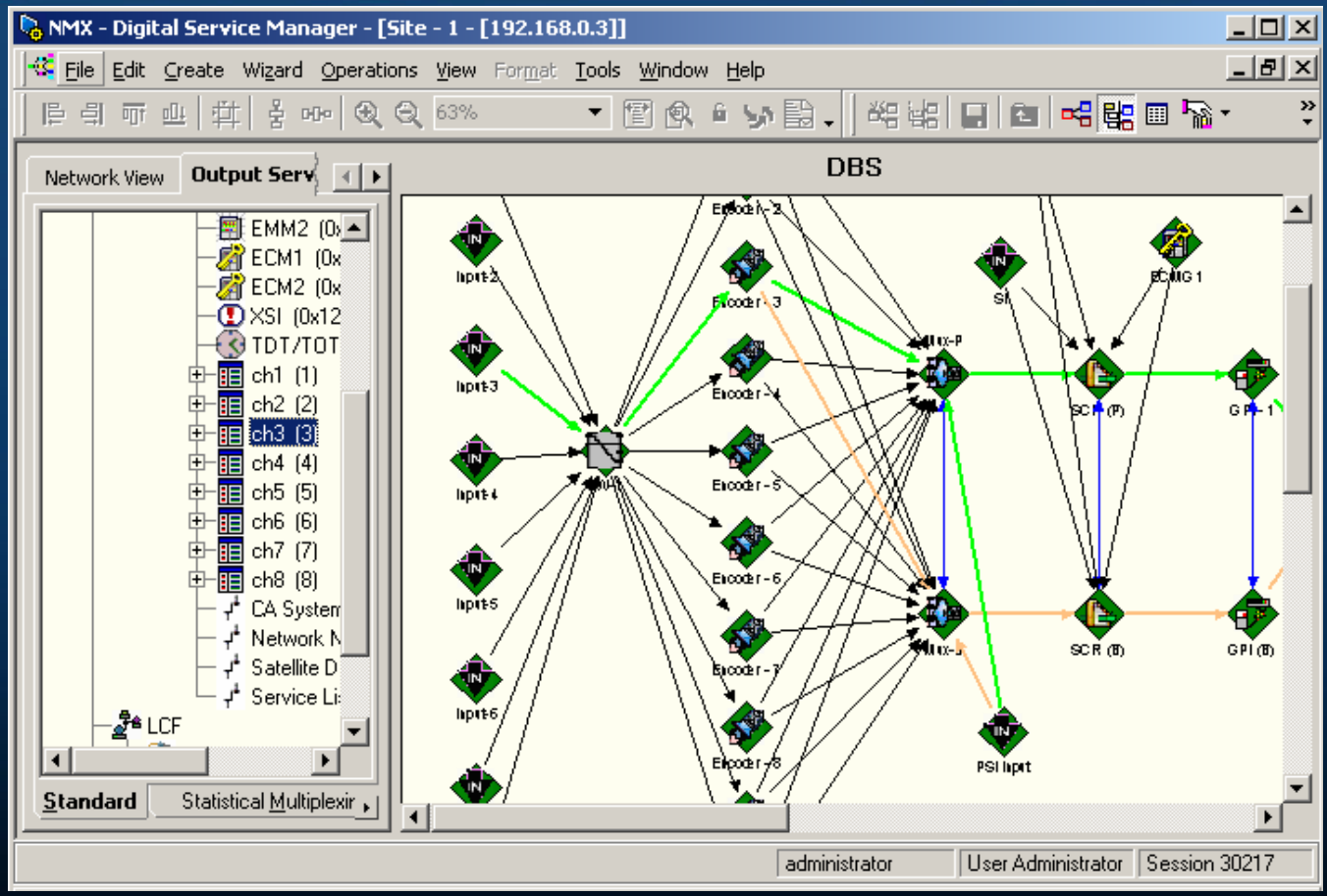
Advanced Redundancy Schemes



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Planning in the VBR World

Service Type	*MPEG-2 Rate*	*Conservative Near term*	*Conservative Long Term*	*Aggressive Near Term*	*Aggressive Long Term*
480i	2.5mbps	2.2.mbps (10%)	1.5 mbps (40%)	2.0 mbps (20%)	1.2 mbps (50%)
1080i	15 Mbps	12 mbps (20%)	9.7 mbps (35%)	10.5 mbps (30%)	6.7 mbps (55%)
720p60	13 mbps	10.4 mbps (20%)	8.4 mbps (35%)	9.1 mbps (30%)	5.8 mbps (55%)
720p24	7 mbps	5.6 mbps (20%)	4.5 mbps (35%)	4.9 mbps (30%)	3.1 mbps (55%)

Typical numbers; dependent on content type and Pq requirements

Planning in CBR World

Service Type	*MPEG-2 Rate*	*Conservative Near term*	*Conservative Long Term*	*Aggressive Near Term*	*Aggressive Long Term*
480i sports	3.5mbps	3.0.mbps (10%)	2.5 mbps (40%)	2.5 mbps (20%)	2.0 mbps (50%)
1080i sports	16 Mbps	13.75 mbps (20%)	11.5 mbps (35%)	11.5 mbps (30%)	9.25 mbps (55%)
720p60 sports	14 mbps	12 mbps (20%)	10 mbps (35%)	10 mbps (30%)	8 mbps (55%)
720p24 sports	8 mbps	7 mbps (20%)	5.75 mbps (35%)	5.75 mbps (30%)	4.75 mbps (55%)

Typical numbers; dependent on content type and Pq requirements

Best of VBR in a CBR World

Problem : Telco Video and Cable VOD is CBR, causing Quality problems or inefficiency

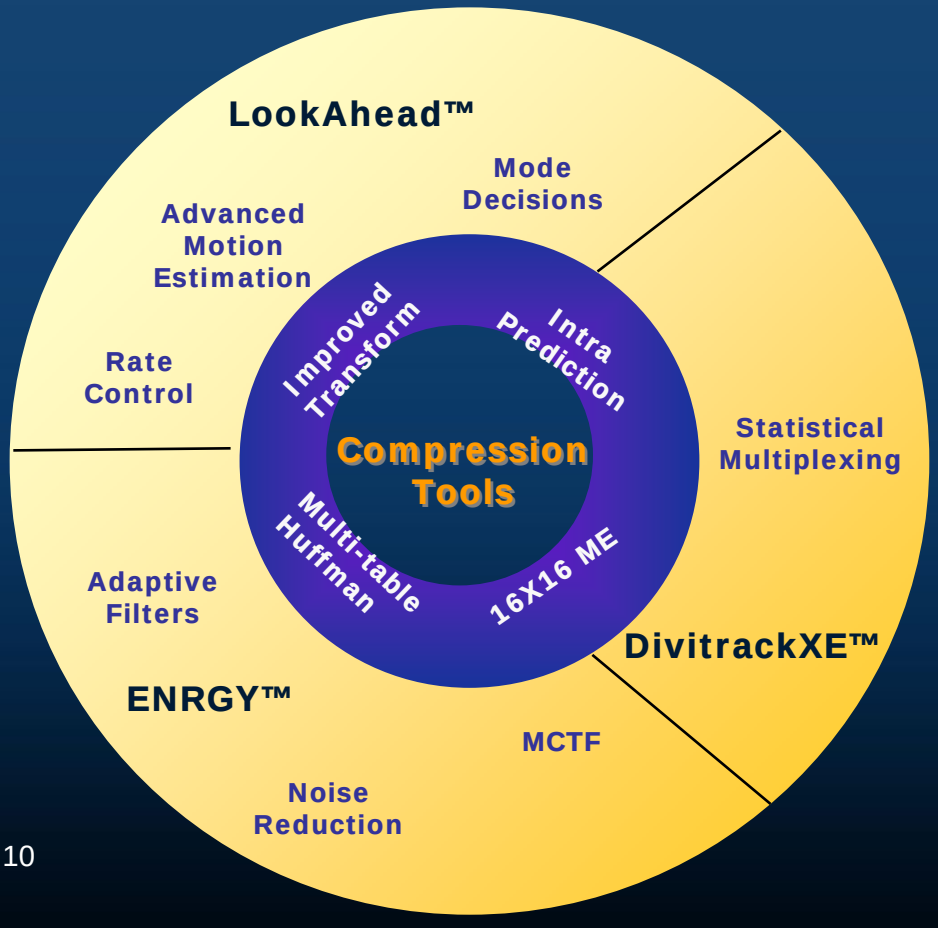
(DBS and standard Cable use VBR).

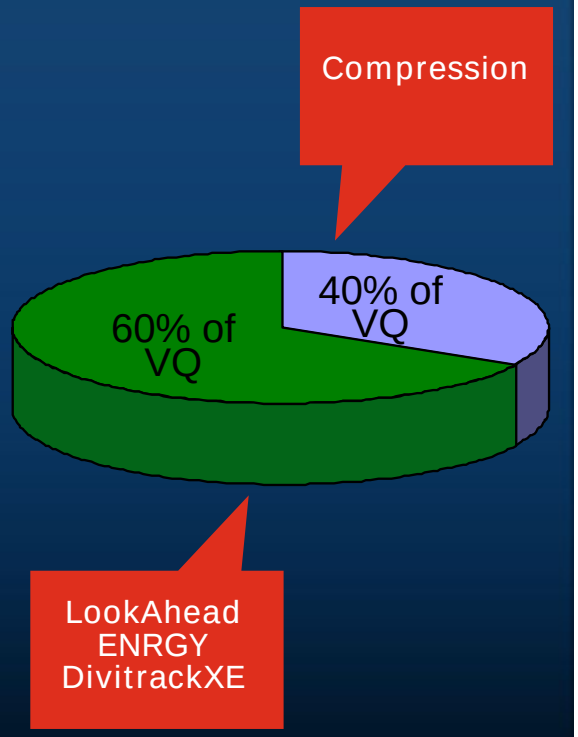
Solution : Encode Video in Capped VBR mode, and intelligently share the VBR bandwidth on access network for other services

Advantages :

- Video can “Steal” BW to internet access without noticeable effects
- Telcos can compete for HIS with Cable by advertising “Maximum BW” for Internet

Basics of Efficient Coding





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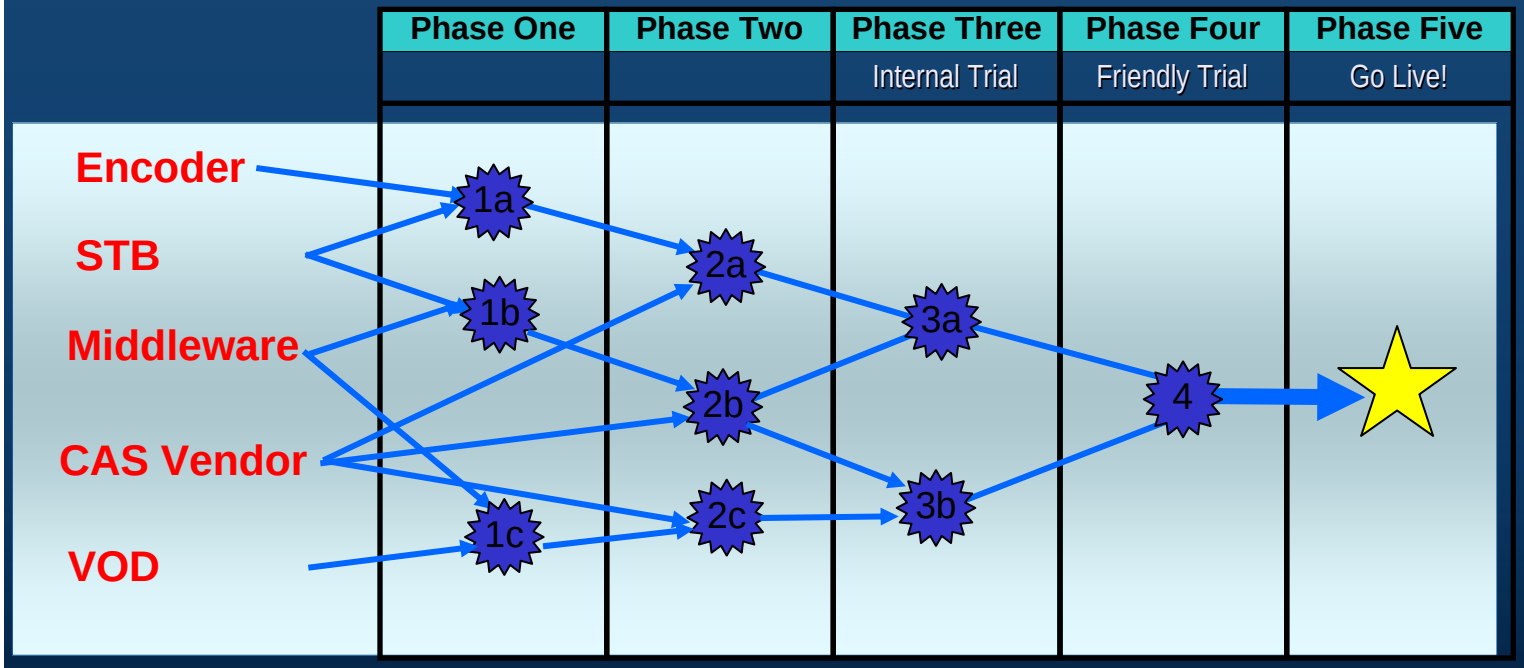
IP-TV Deployment Timeline



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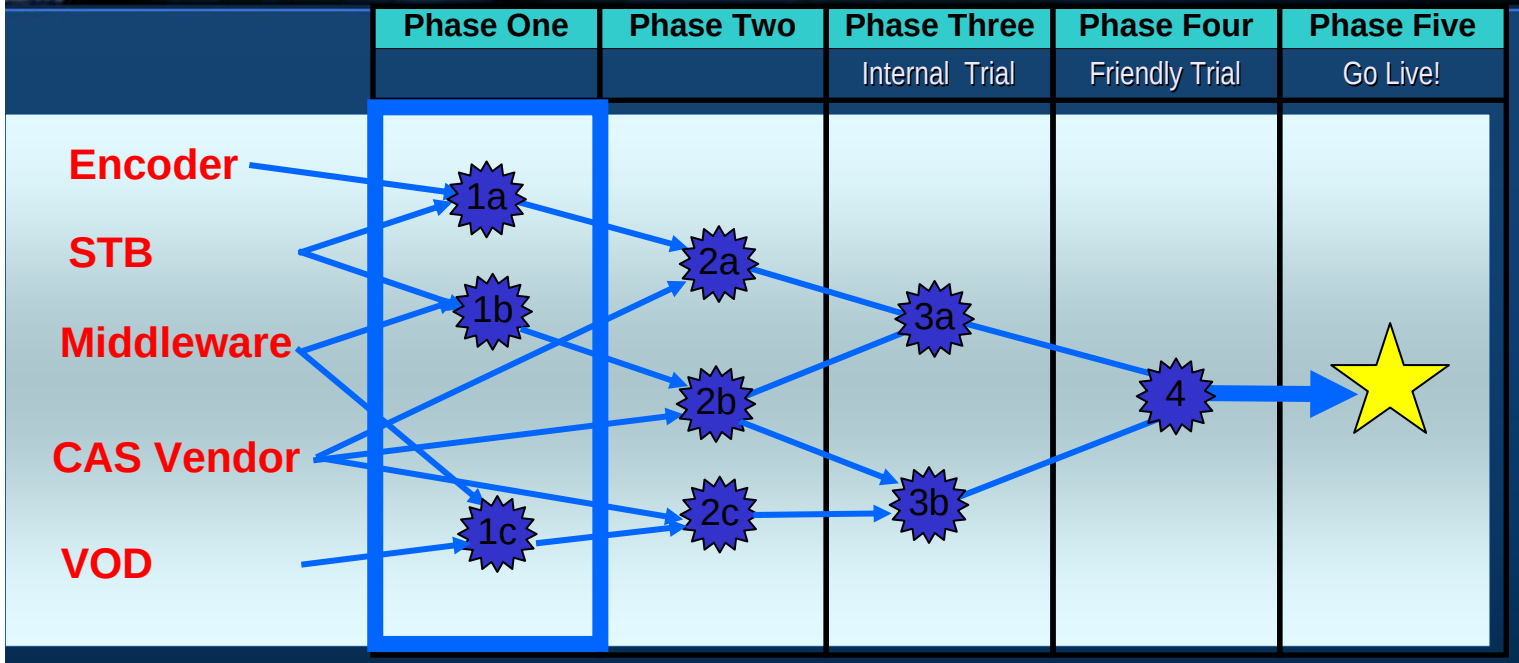
Phase 1



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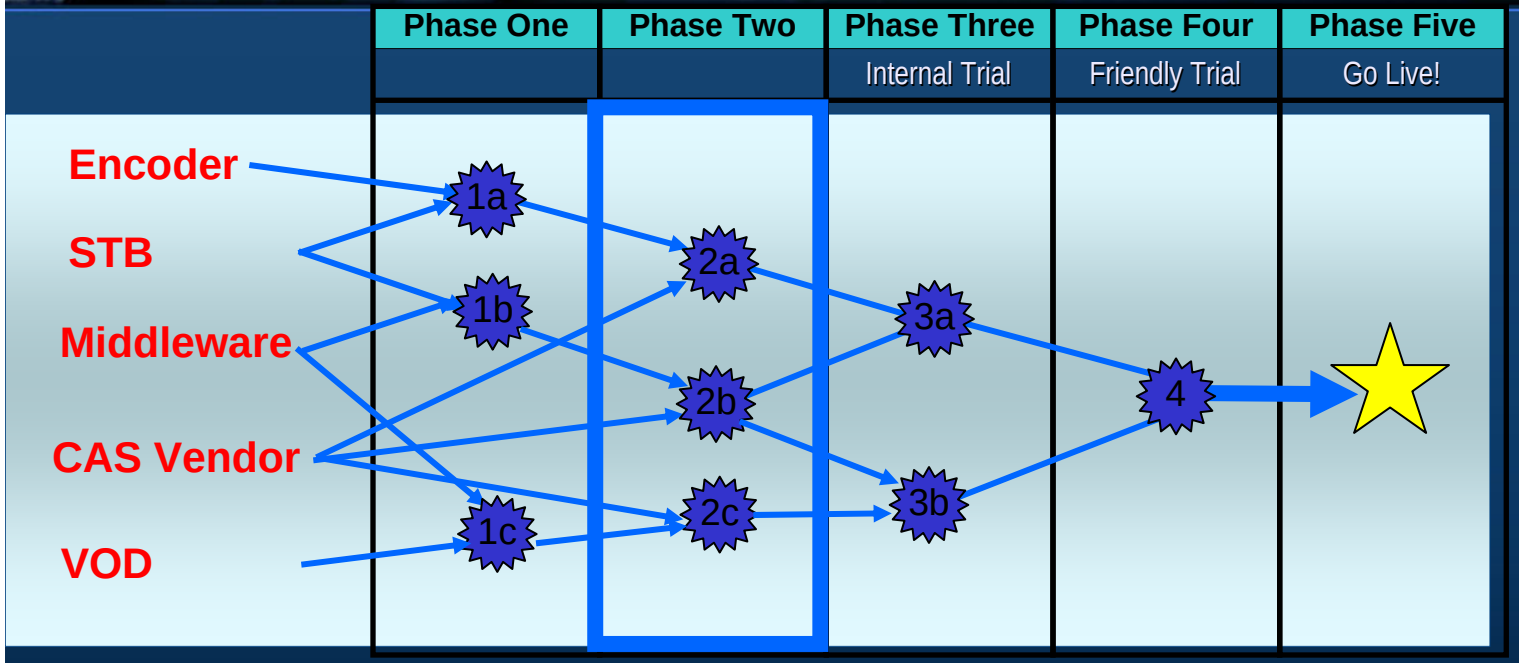
Phase 2



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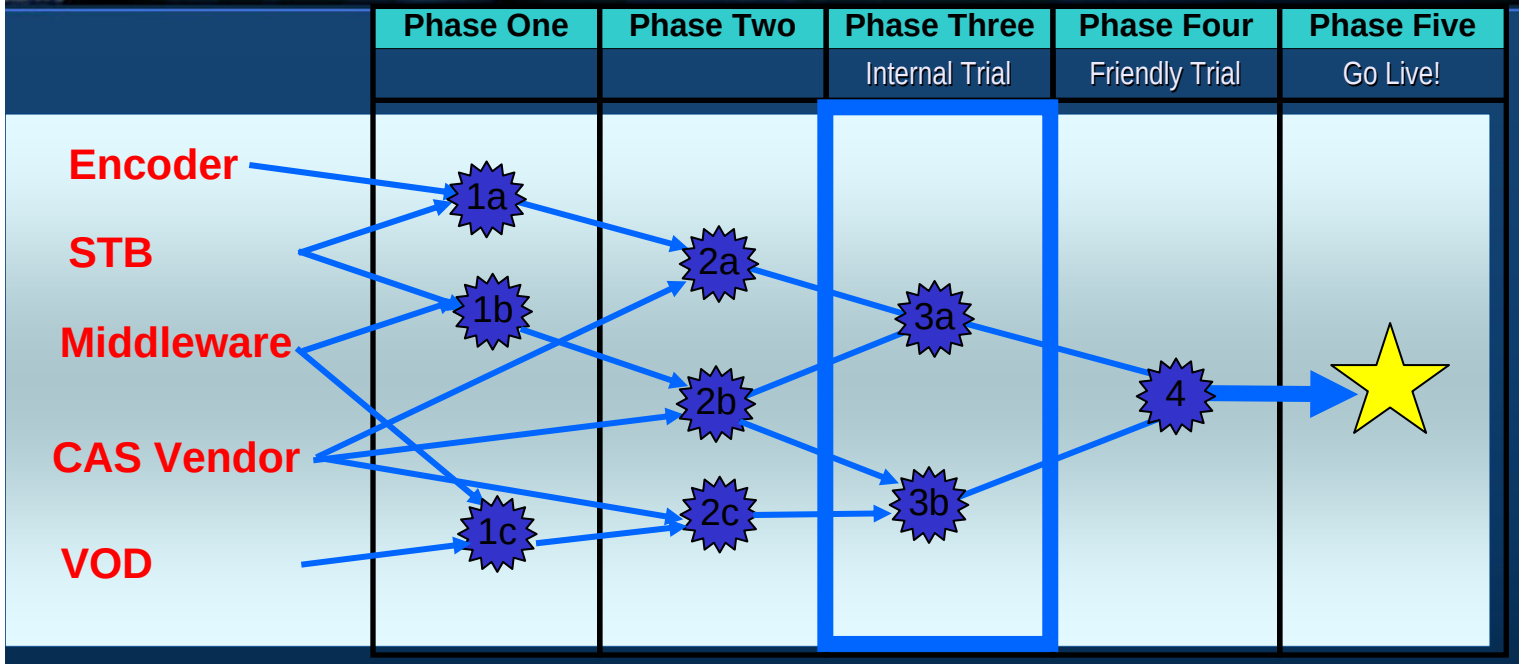
Phase 3



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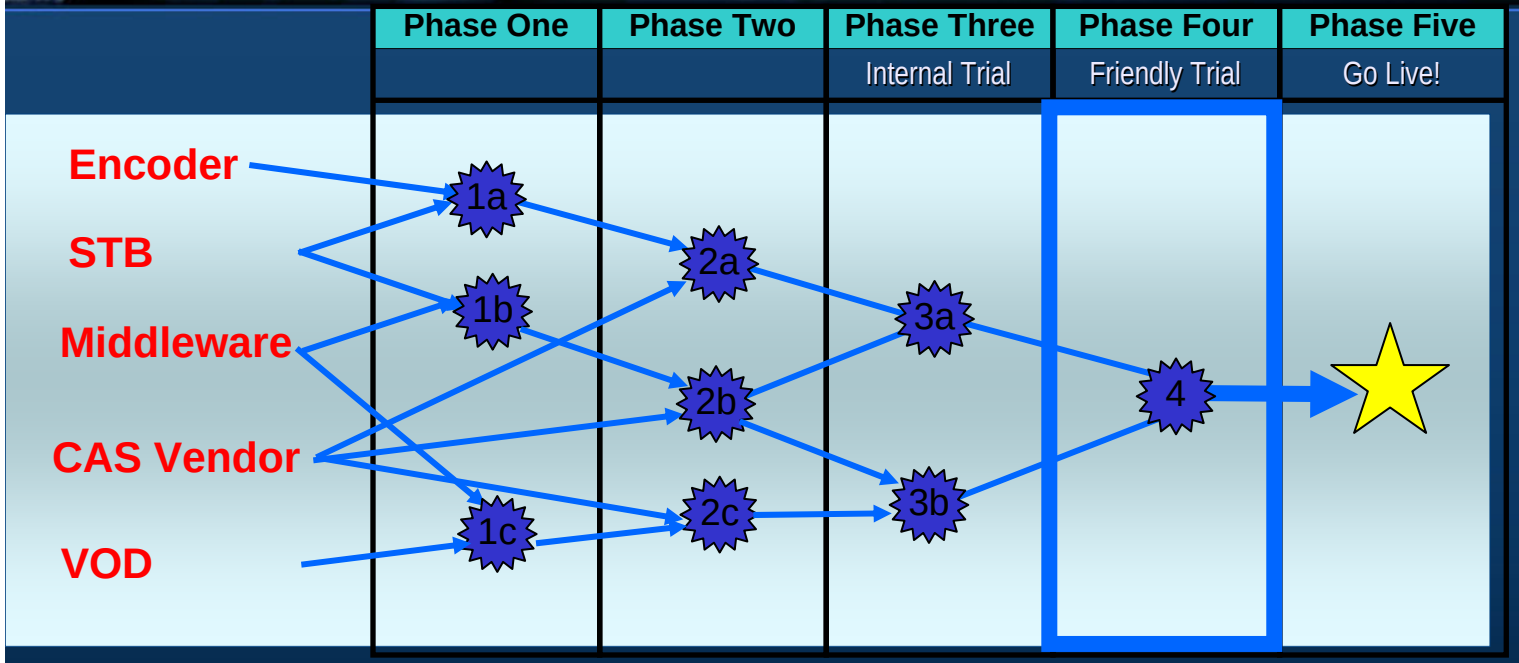
Phase 4



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Pre 2004 Telco Customer Base

All providing IPTV to their customers using MPEG2

Customer	Country	Network	Encoder Model
ManitobaTel	Canada	VDSL	MV50
SaskTel	Canada	ADSL	MV50
Qwest	US	VDSL	MV45/MV50
Telefonica	Spain	ADSL	MV50
YahooBB!	Japan	FTTH/ADSL	MV50/MV100
NTT	Japan	FTTH	MV100
Surewest	US	FTTH/ADSL	MV50

Growing IP-TV Customer Base

Next Generation IP/Telco Customers (2004 on)

Customer	Country	Network	Format
Video Networks Limited	**UK**	**ADSL2+**	**MPEG2 > AVC**
CanalSatDSL	France	ADSL2+	MPEG2> AVC
Softbank (BBCable)	Japan	ADSL	MPEG2 > VC-1
Aliant	Canada	ADSL2+	MPEG2 > AVC/VC1
BCE	Canada	ADSL2+/ VDSL2+	MPEG2 > AVC
Telmex	Mexico	ADSL2+	MPEG2 > AVC
KDDI	Japan	VDSL	MPEG2 > AVC
NTT	Japan	VDSL	MPEG2