Erlang Training and Consulting Ltd

Erlang's Journey to the Clouds

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Popular definition of the Cloud

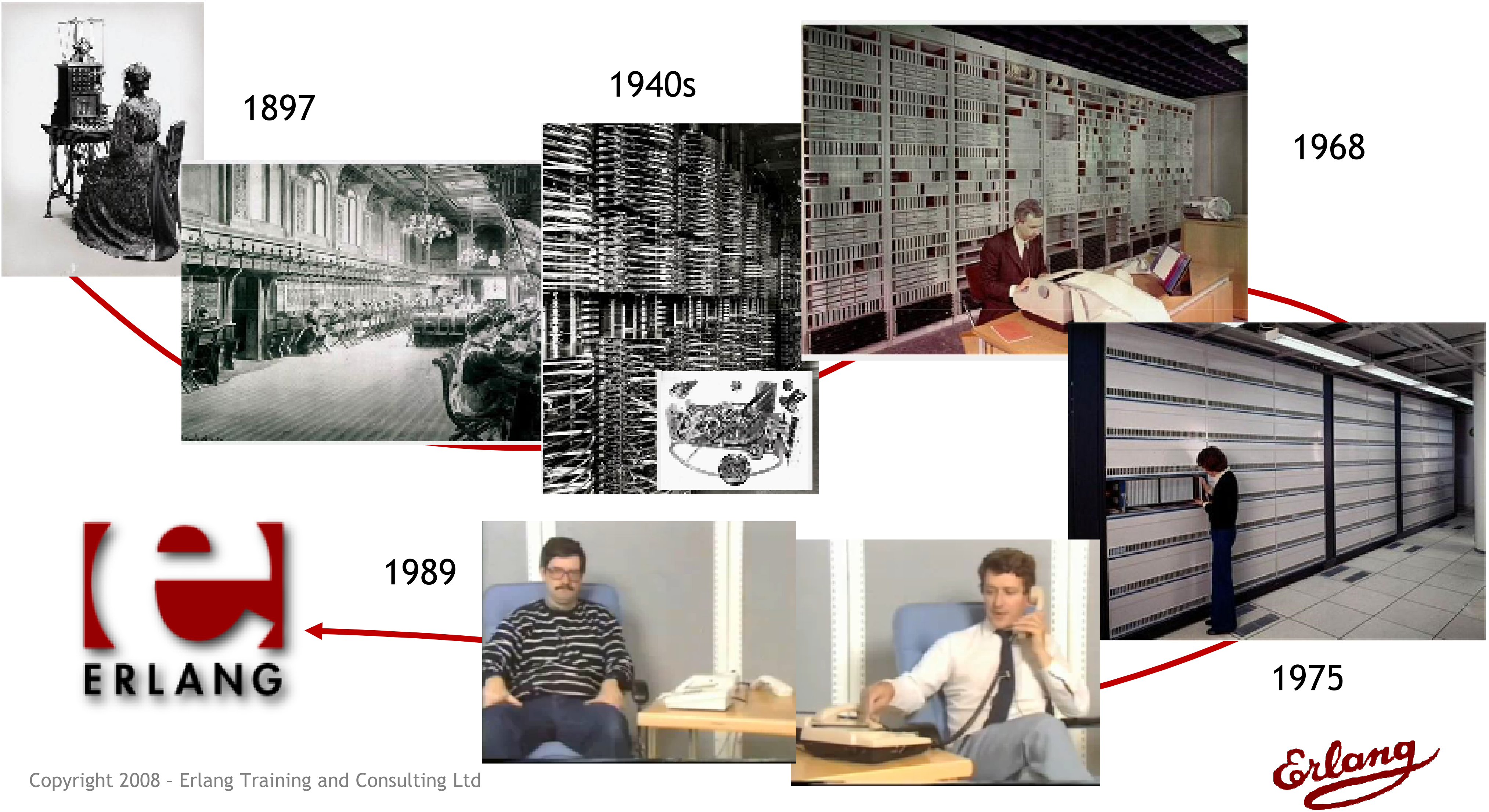
Whatever [pick your favourite company] happens to be heavily invested in

The Cloud, for us old-timers

- Software as a Service
  - Access program and data from anywhere, using any device
- Hardware as a Service
  - Access computing resources as-needed, without owning a data center
- “Resolving the tensions between the end-user and the data center”
  - Power vs Accessibility
  - Powerful clients vs Ease of deployment
  - (Google VP Vic Gundotra @ Google I O Keynote 2008)

The origins of Erlang

Addressing the growing software complexity problem in telecoms



Telecom in the 90s

‘Stovepipe model’ on its way out

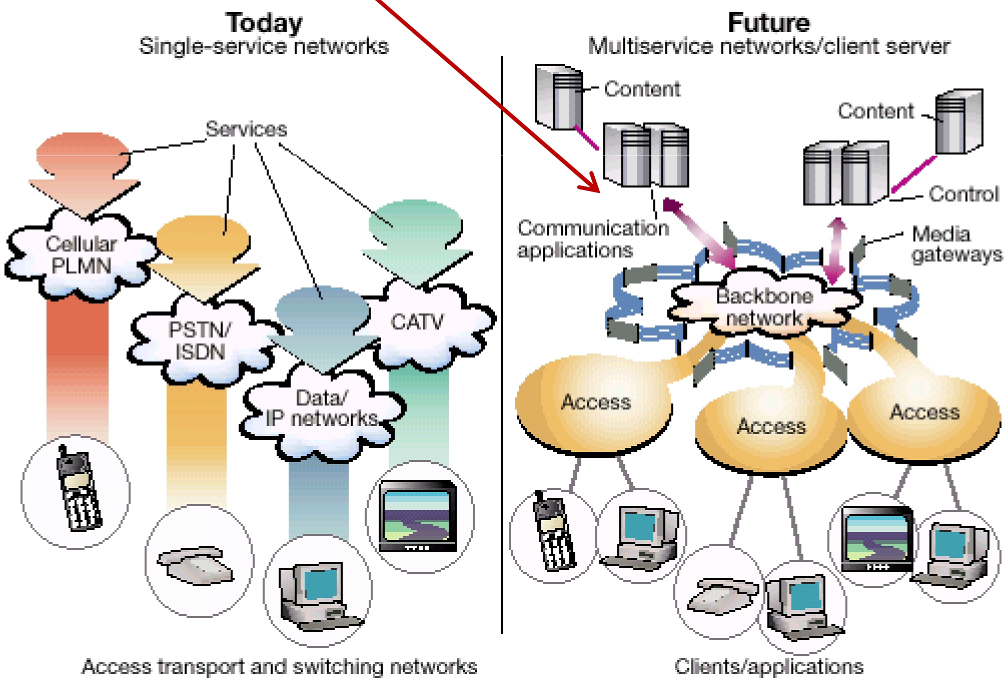
The network as a communications ‘cloud’

Broadband ISDN -> Voice over ATM -> Voice over IP

Today -> Mobile IP (IPv6)

“Conversational services”

Erlang Problem Statement (paraphrased):
“How can we program telephony
in THIS environment?”

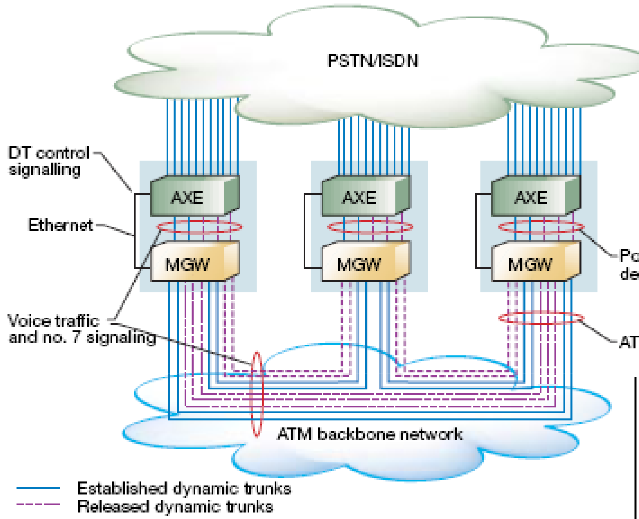


Source: Ericsson Review No 1, 1998

Bridging the Legacy

Source: Ericsson Review No 3, 2000

Figure 3
The ENGINE trunked network.



Virtual voice trunks

Single-Domain
Voice-over-Packet

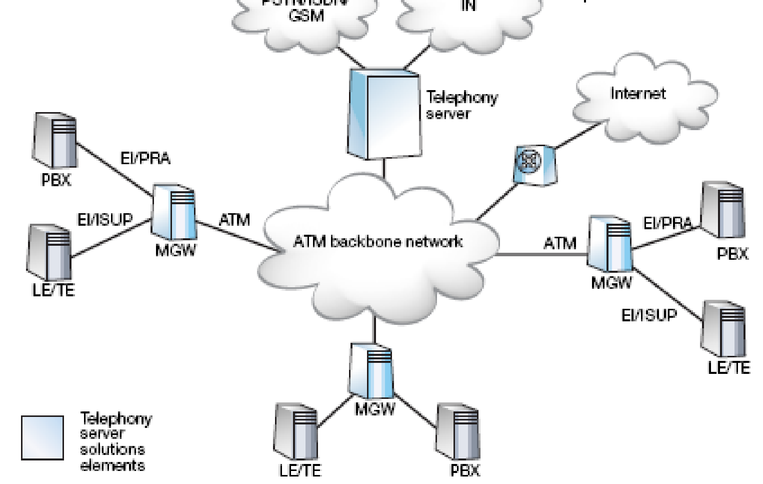
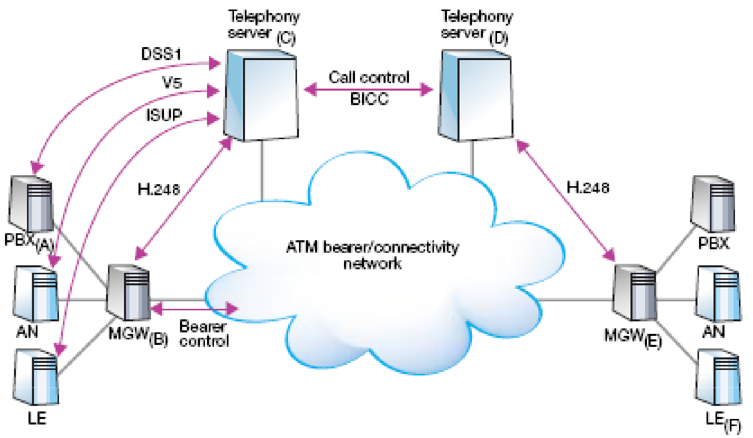


Figure 4
ENGINE Bridgehead.

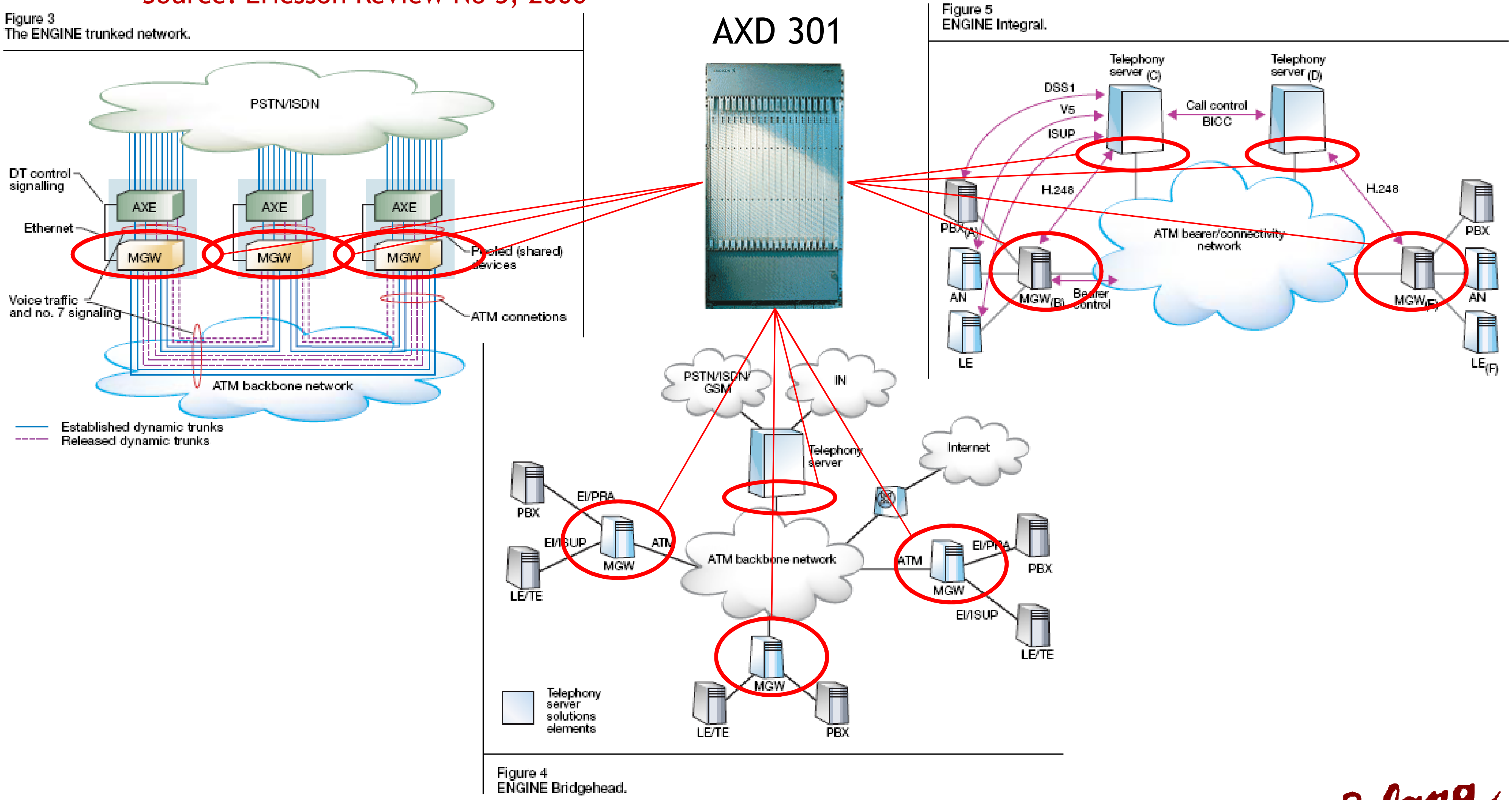
Figure 5
ENGINE Integral.



Cross-domain
Voice-over-Packet

Erlang the Enabler

Source: Ericsson Review No 3, 2000



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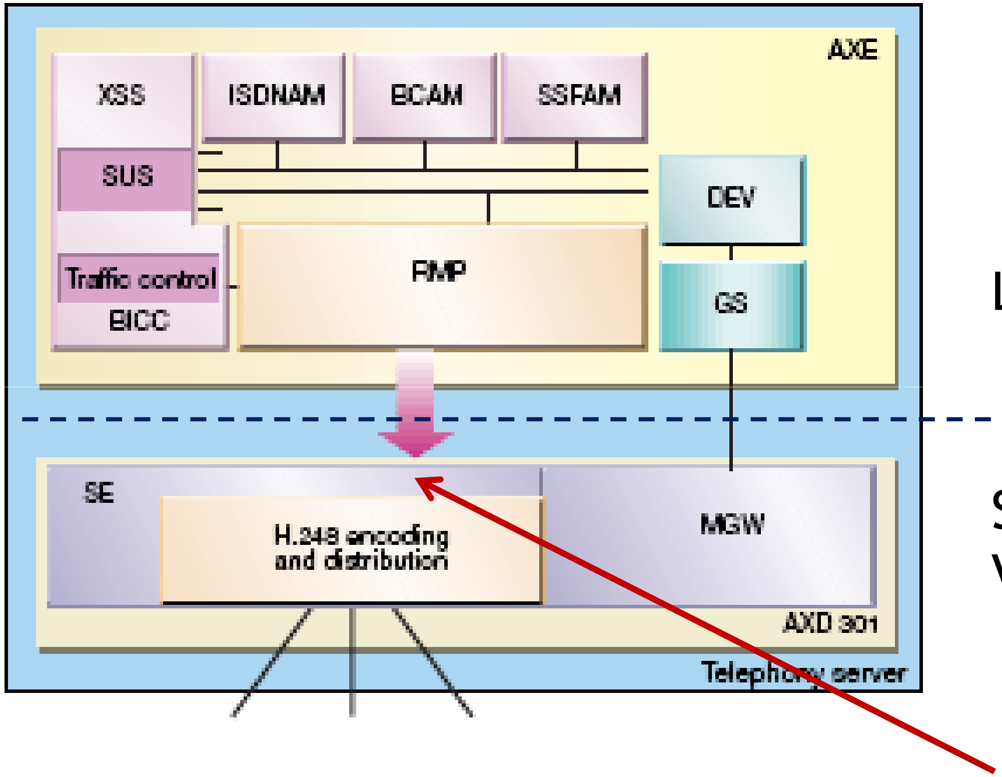
Erlang the Enabler



Legacy Phone Switch

PLEX

Erlang

Switch Emulator and
Voice-over-ATM Controller

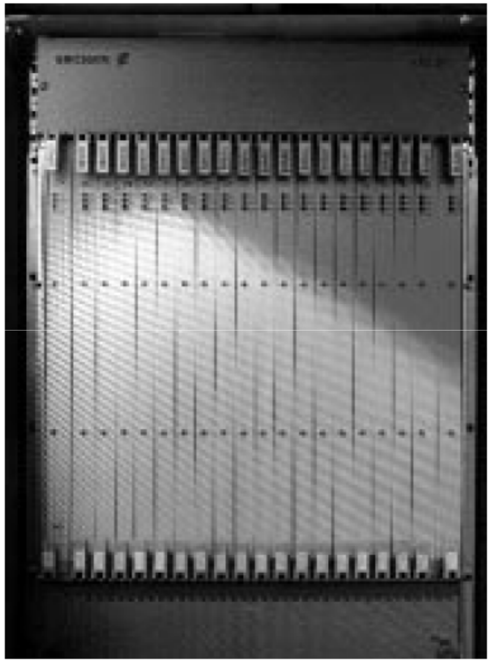
Extremely complex state machines
Scalability and redundancy required
> 99.999% uptime, including maintenance

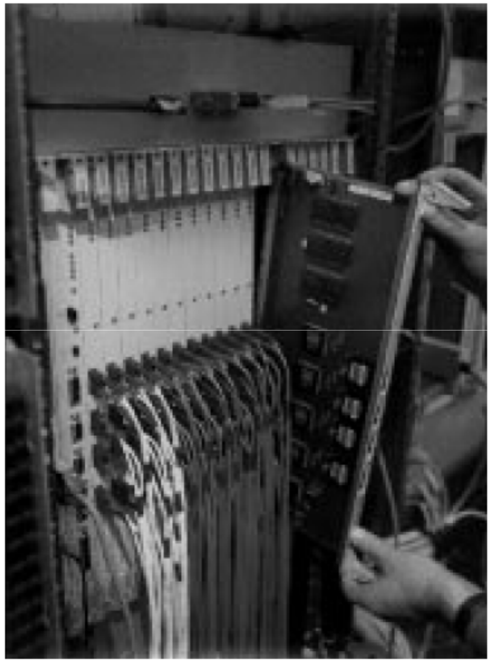
So What Next...?

- The first big project worked out
- Erlang proved ready for the Big Time

- Erlang released as Open Source 1998
  - No fanfare, no marketing...
  - 1-2 messages/day on the mailing list first year
  - < 1000 downloads/month
- New initiatives needed...

Idea: A Scalable Web Server...?





Build a 5-nines scalable web server based on AXD 301

- 256 processor boards on a non-blocking, redundant 160 Gbps backbone!

Two erlang-related Innovation Cell proposals presented at the same time

The AXD 301 track rejected – Ericsson doesn’t sell web servers

Idea: A Scalable Web Server...?

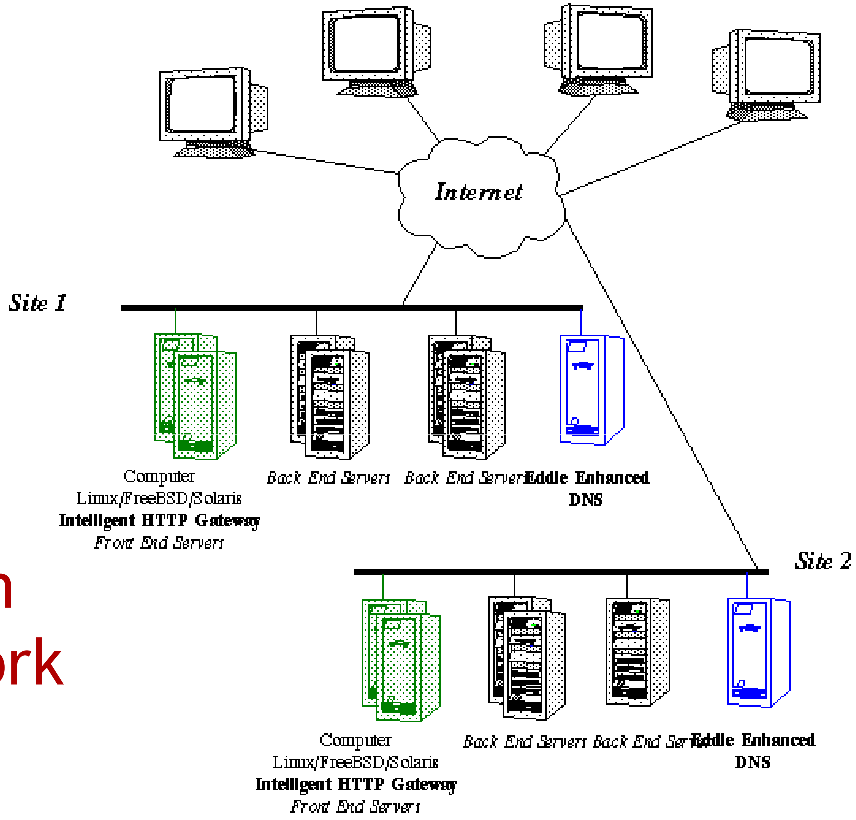


Figure 3. Distributed Web Server using the Eddie Enhanced DNS and Intelligent HTTP Gateway packages.

- Eddie – An Ericsson-sponsored Open Source web server cluster framework 1999
  - Dynamic load balancing
  - Auto-detects the capacity of each server
  - Works across wide-area networks

Scalable Email - Bluetail Mail Robustifier

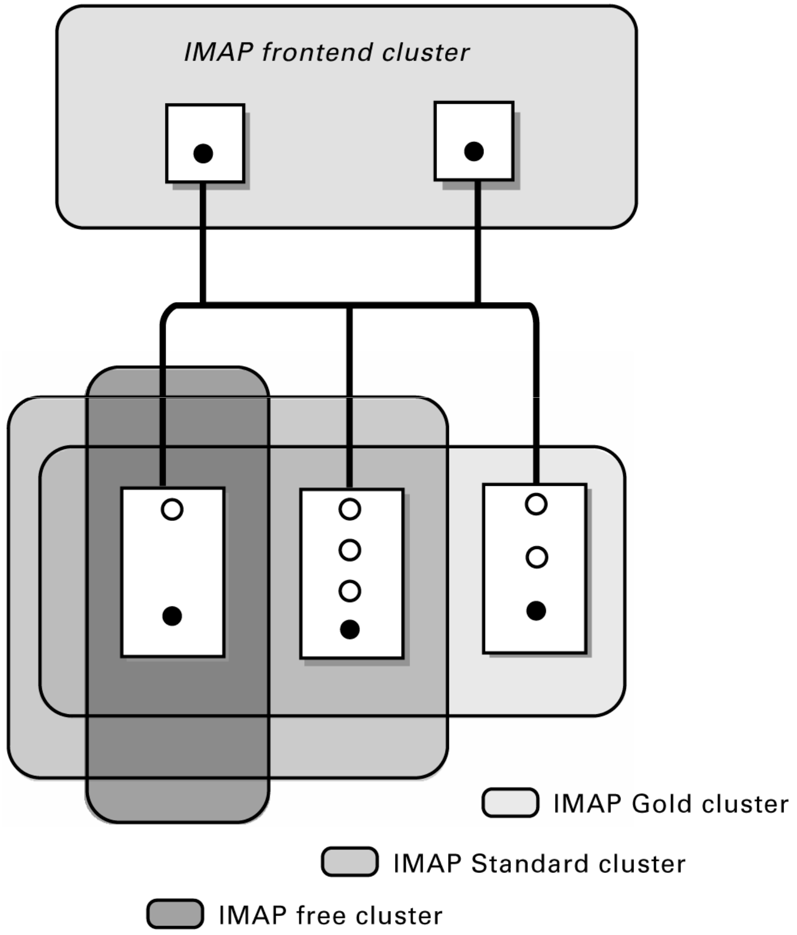
Load-balancing frontend to standard mail servers

Added

- Robustness
- In-service scalability
- Service differentiation

...transparently

Released 1999

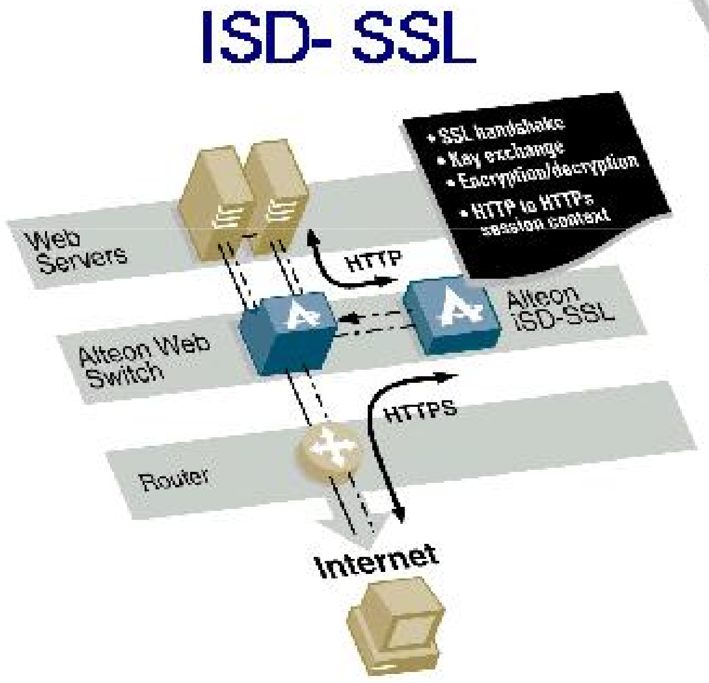


Scalable https – SSL Offload Accelerator

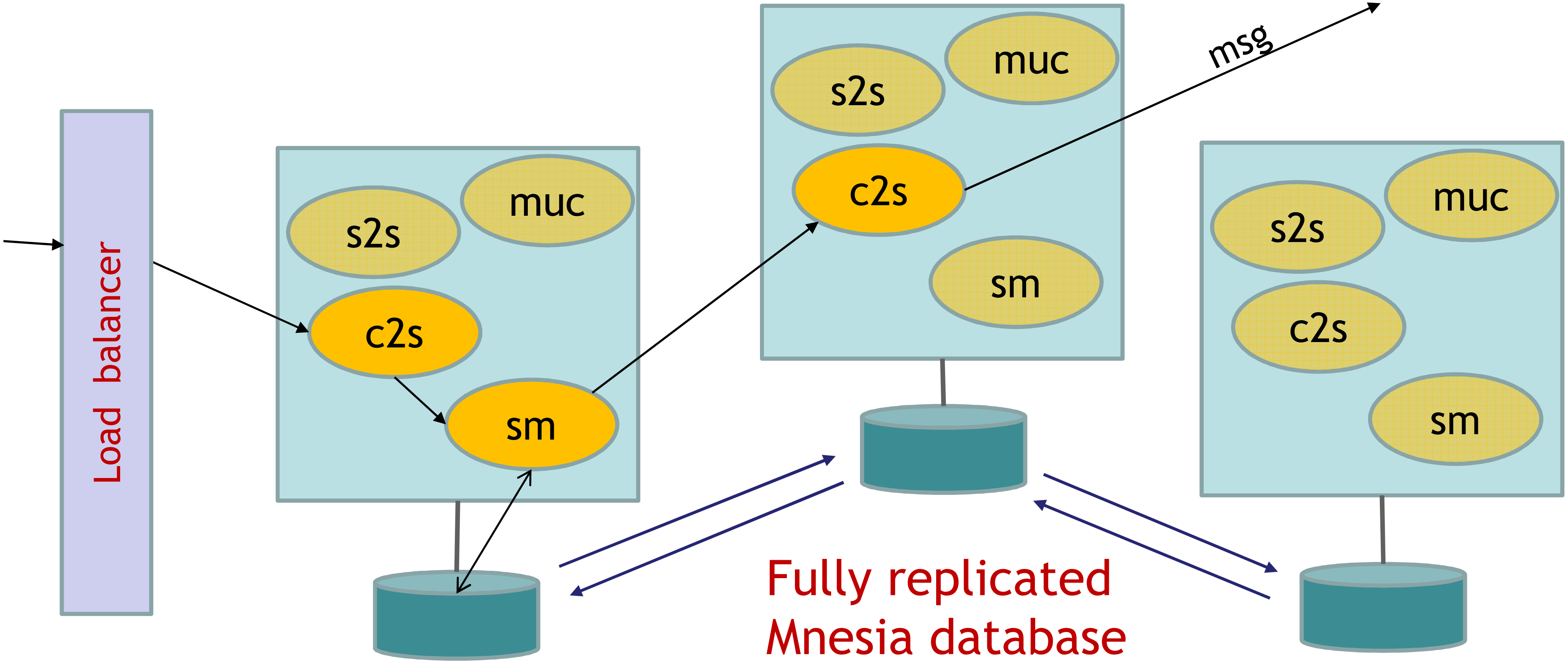
Bluetail bought by Alteon (Alteon bought by Nortel)

Continuing to make scalability solutions on commodity hardware

ISD-SSL released 2001



Scalable XMPP Chat - ejabberd



Fully replicated Mnesia database

First released 2003

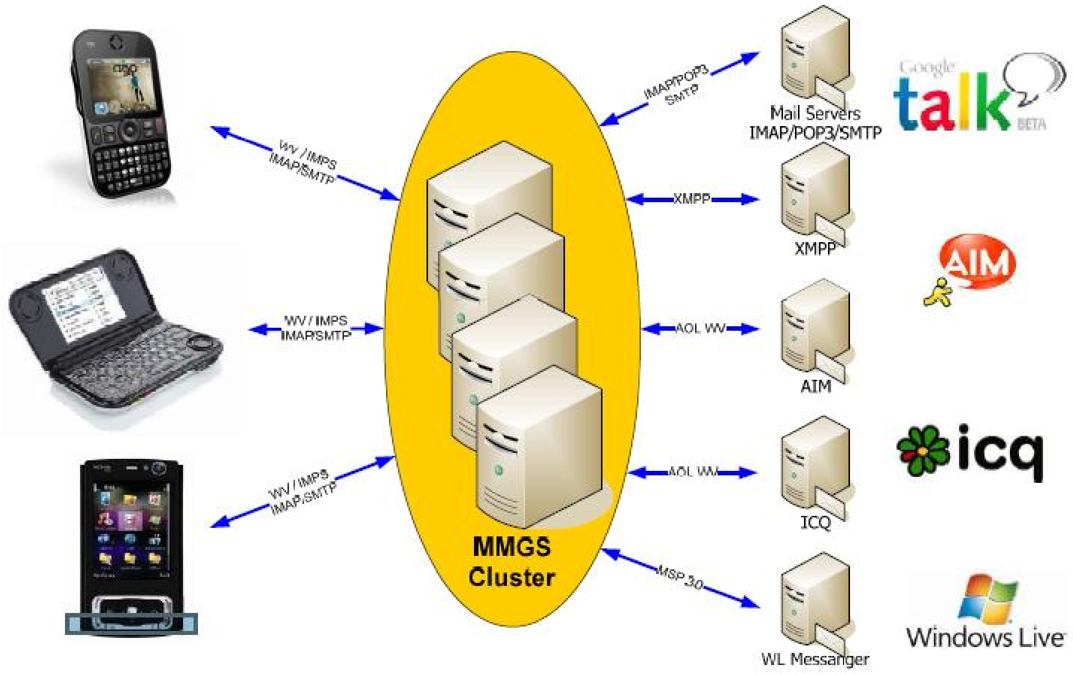
Runcom IXI MMGS – Email and IM Gateway

Massively scalable

>12k messages/second

150,000 connected users

Bridging different messaging standards



Erlang, the un-Ruby

- Offering a cost-effective way to build...
  - Massively scalable
  - Extremely robust
  - Eminently maintainable

  ...back-end services (using an odd-looking syntax)

- **But organizations developing such systems are by nature conservative!**

- Perl (“duct tape”), Ruby and Python (OO scripting) offered something more immediately useful to individual programmers

What Changed?

- **Web services matured** – started requiring scalability and serious uptime
- **Web 2.0** – opened up for a new class of (conversational) web services
- **Multicore** – forced everyone to start thinking about concurrency
- **Virtualization** – brought distributed systems development to the masses

New wave – Web frameworks

- Yaws – fast dynamic-content web server
- MochiWeb – dynamic-content web server with JSON
- ErlyWeb – Web development framework
- Erlang Web – XHTML-based Web framework
- Nitrogen – Erlang-style JQuery
- WebMachine – RESTful Web services
- Chicago Boss – Django-style Web framework, but asynchronous

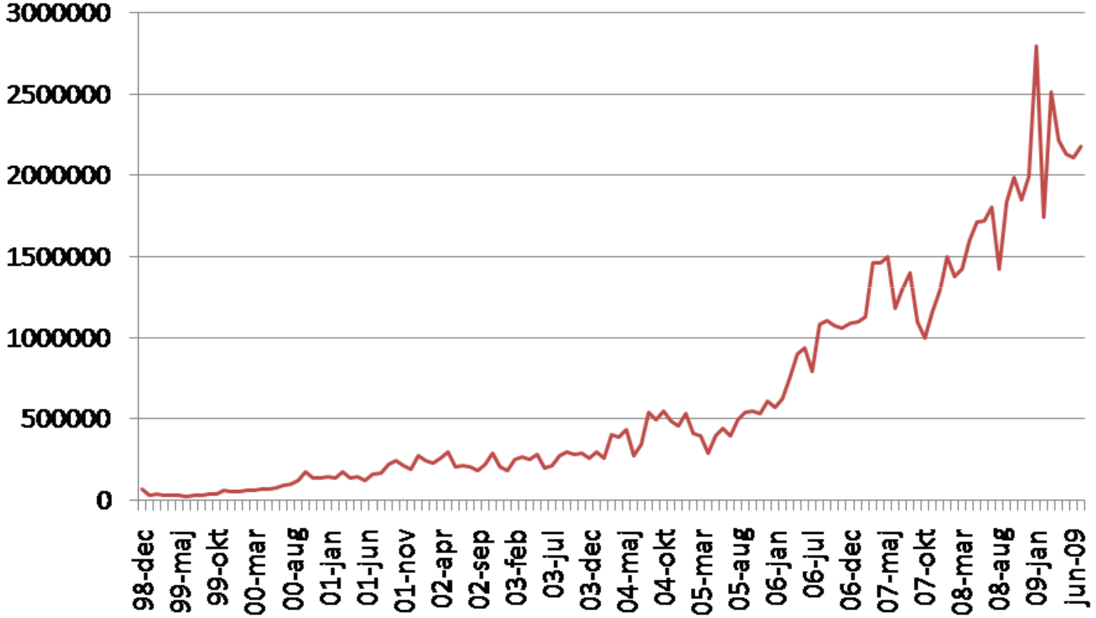
New wave – Databases for the Cloud

- Scalaris – Distributed Hash Tables
- CouchDB – RESTful Document Store
- Dynomite – Dynamo-like Distributed Key-Value Store
- Riak – Decentralized Key-Value Store w/map-reduce
- Disco – Map-Reduce framework
- Client versions for non-Erlang storage engines
  - MongoDB, TokyoCabinet, MySQL, BDB, ...

Conclusion

- Erlang was born and bred for Cloud infrastructure
- Connectivity, scalability, messaging are becoming mainstream concepts
- Cloud computing brings Distributed Programming to the masses
- New exciting components appear every month

Requests per month to www.erlang.org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