



AX Series

World Leading Application Delivery Controllers

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Corporate Backgrounder

▶ Lee Chen (founder) co-founder Foundry Network

- ◆ 4th largest switch vendor in the world – IPO \$8.7 Billion
- ◆ Known for High Speed, Backbone switching
- ◆ Co-founder of Centillion

▶ Founded in 2004

- ◆ EX Series – Bandwidth Management
- ◆ ID Sentries – Network Identity Management

▶ AX Launched in 2007

- ◆ New platform ACOS – designed from the ground up
- ◆ 4 AX customers in 2007
- ◆ 200+ customers in 2008
- ◆ 500+ Customer by the end of 2009

A10 Locations

- ▶ **180 employees - Globally**
- ▶ **North America**
 - ◆ San Jose CA HQ
 - ◆ Regional offices across USA
- ▶ **EMEA**
 - ◆ 10 Employees – March 2010
 - ◆ 20 Employees- December 2010
 - ◆ Den Haag, NL EMEA HQ
 - ◆ Regional offices, London, Paris & Munich
- ▶ **APAC**
 - ◆ Regional offices, Japan, China & Korea

What Do We Do?

- ▶ **Optimize Business Application Delivery and Performance**
- ▶ **Medium-Large Scale Enterprise**
- ▶ **Telco's/Carriers/ISP's**
- ▶ **Currently the Absolute Price / Performance Leader in ADC market**
 - ◆ 1st & 2nd Fastest “Super Computer ADC” in the world
 - ◆ Only 64bit ADC solution in the world
 - ◆ All platforms delivering SSMP from day one in a Compact Form
 - ◆ (Scalable Symmetric Multi- Processing)
 - ◆ 400+ Customers and Growing

What are A10 networks USP's?

➤ Superior System Design & Architecture

- ◆ Scalable Symmetrical Multi Processing
- ◆ Decoupled CPU's
- ◆ Shared Memory
- ◆ 32B & 64Bit
- ◆ Feature Rich
- ◆ Performance Rich

➤ Licensing Model

- ◆ All Features Included
- ◆ Full Performance Included

➤ Support & Development Capability

- ◆ Full support for all features
- ◆ Rapid Feature Development



Superior System Design & Architecture



SSL Acceleration Module – SSL Processing

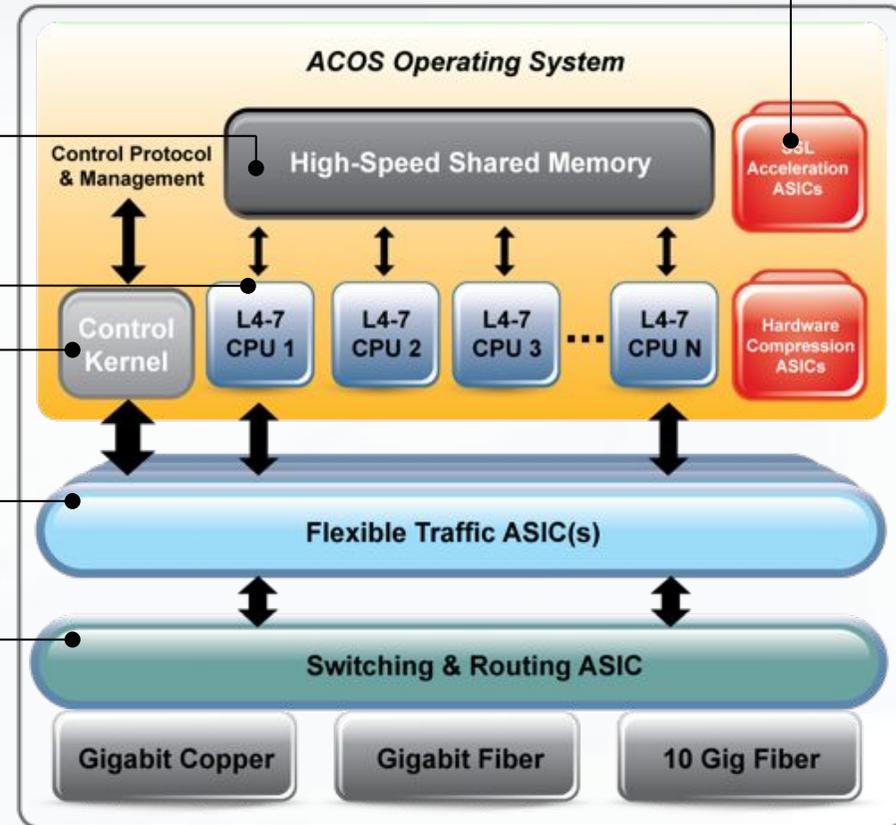
Application Memory – Session Tables, Buffer Memory, Application Data

L4-7 CPUs – L4-7 Processing, Security

Control Kernel – CLI, GUI, Management Tasks and Health Checking

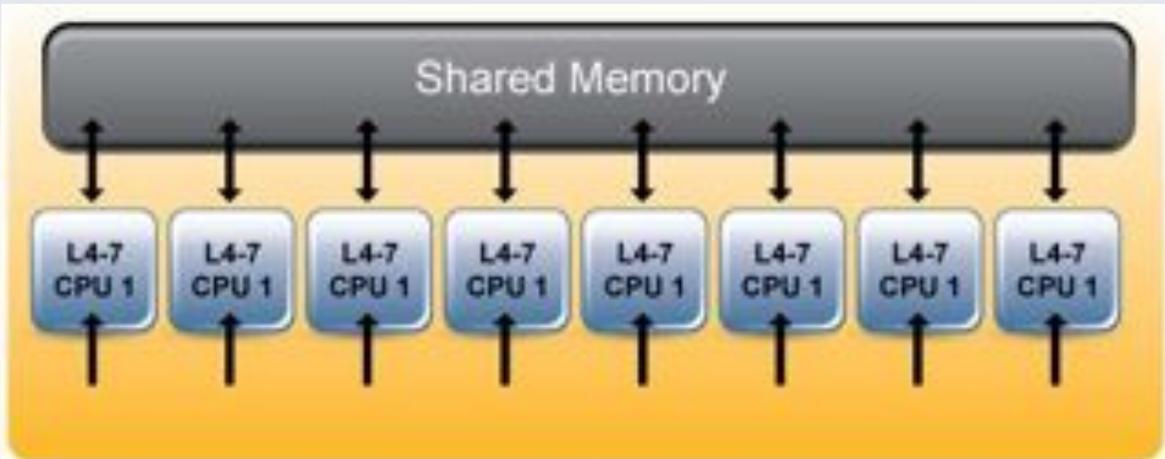
Flexible Traffic ASIC (FTA) – Distributes Traffic Across L4-7 CPUs, Efficient Network I/O, DDoS

Switching & Routing ASIC – L2 & L3 Processing and Security

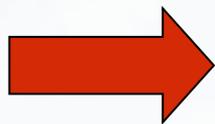
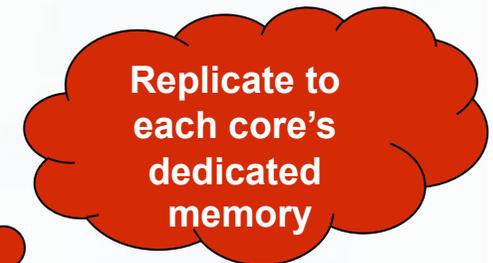
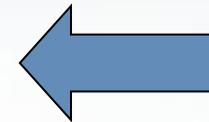


Superior System Design & Architecture

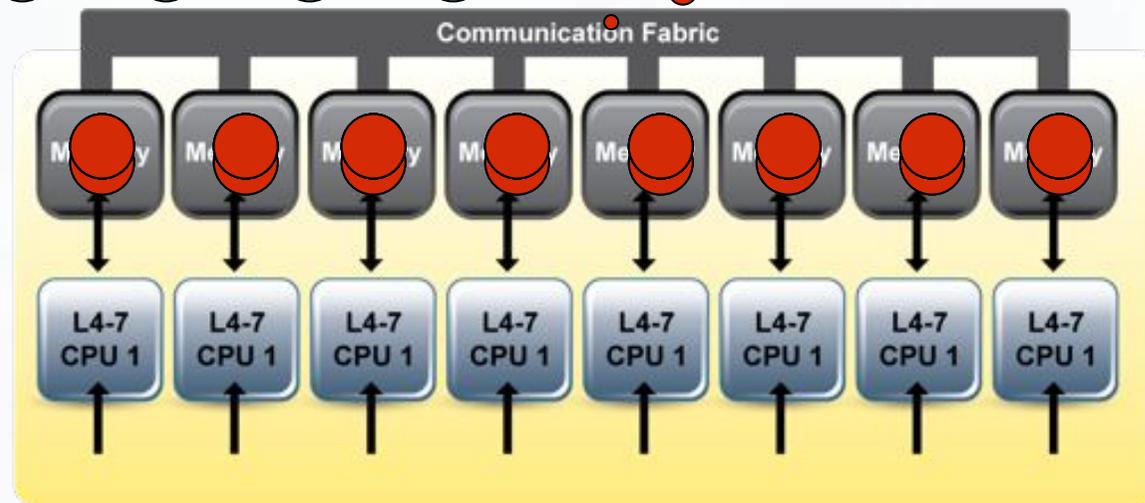
A10



AX Series
Shared Memory



All other platforms
today



Maximizes Memory

▶ Shared Memory

- ◆ One copy of each item kept in memory, for example
 - ◇ OS uses 64 MB of RAM, Total AX Memory Usage = 64MB RAM
 - ◇ Cached Objects, 10 x 0.5 MB, Total AX Memory Usage = 5 MB
 - ◇ Total 69 MB of RAM used



▶ Without Shared Memory

- ◆ Multiple copies of each item kept in each cores memory, for example 32 cores
 - ◇ OS uses 64 MB of RAM per core, Total Memory Usage = 2048 MB RAM
 - ◇ Cached Objects, 10 x 0.5 MB per core, Total Memory Usage = 160 MB
 - ◇ Total 2208 MB of RAM used



- ▶ Total system memory is reduced dramatically by the non-shared memory architecture

So What?

➤ Highly Efficient Advanced Core Operating System (ACOS)

- ◆ Memory, processing & I/O efficiency
- ◆ More user connections per unit
- ◆ Faster application access

➤ Best Combination of Software and Hardware

- ◆ Hardware off-load and acceleration
- ◆ Less Servers, Rack Space, Power, Cooling, Server Licenses
- ◆ Reduced Operating Costs

➤ Scalable Symmetrical Multi-Processing (SSMP)

- ◆ Highest industry performance
- ◆ Maximum headroom for growth (No forklift Upgrades).

The logo for ACOS, rendered in a large, metallic, 3D-style font with a blue and silver gradient and a beveled edge.The logo for SSMP, rendered in a large, metallic, 3D-style font with a blue and silver gradient and a beveled edge.

Efficiency

Dramatic Savings per transaction – 80%

	A10 Networks	Competitor
Appliance	AX 5200	7 RU Chassis (Fully loaded w/4 blades)
L4 CPS	3m+	1m
Unit Cost	\$195,000*	\$468,000
Cost Per Transaction	\$0.06	\$0.47
Savings	AX Series Saves over 80% per transaction	
Additional Performance and Software Licensing	No	Yes

*AX 5200 includes all features at no additional charge. All numbers are based on published data from vendor websites.

Superior Performance per Watt – Over 10x



4412

- Maximum Power Consumption: Only 680 Watts

*Transaction cost does not include ongoing operating costs

Data Center Efficiency

AX 5200 vs. Chassis

Max Power Consumption	680 W	1,920 to 2,500* W
L4 Performance per Watt	4,412	400 to 781
Max Heat Generated	2,321 BTU/hour	6,553 to 8,533 BTU/hour
Energy Cost	Save \$\$	Over 2.5X cost
Cooling per Hour	0.19 tons	0.55 to 0.71 tons
Carbon Footprint (CO ₂)	2.4 metric tons/year	7 to 9 metric tons/year
Space	2U	7U to 8U
Price	Save \$\$	Over 2X Cost



AX 5200



7 RU Chassis

* Estimated

What Licensing Model?

- ▶ **Layer 4 and Layer 7 Application Acceleration**
 - ◆ SSL ASIC
 - ◆ RAM caching – static or dynamic
 - ◆ HTTP compression
- ▶ **aFlex L7 TCL scripting for deep packet inspection**
- ▶ **GSLB – Global Server Load Balancing**
- ▶ **Advanced NAT options**
- ▶ **DNS Application Layer Firewall**
- ▶ **Operates in Layer 2/Layer 3 simultaneously**
- ▶ **aXAPI REST based XML API for custom management**
- ▶ **Virtualized management**
 - ◆ Role-Based and Partition-Based Management
 - ◆ Seamless Management for Multiple Devices
- ▶ **IPv4 and IPv6 load balancing and management**
- ▶ **Full web interface or industry standard command line interface**

AX Series

So What?

➤ Optimization Features Included

- ◆ Offload processor intensive tasks to AX
- ◆ Offering either:
 - ◇ Less Servers, Rack Space, Power, Cooling, Server licenses (**reduced operating costs**)
 - ◇ OR
 - ◇ More customers, connections, orders with the same equipment (**reduced capital expenditure for growth**)

The logo for ACOS, rendered in a large, metallic, 3D-style font with a blue and silver gradient and a shadow effect.

➤ Global Server Load balancing Included

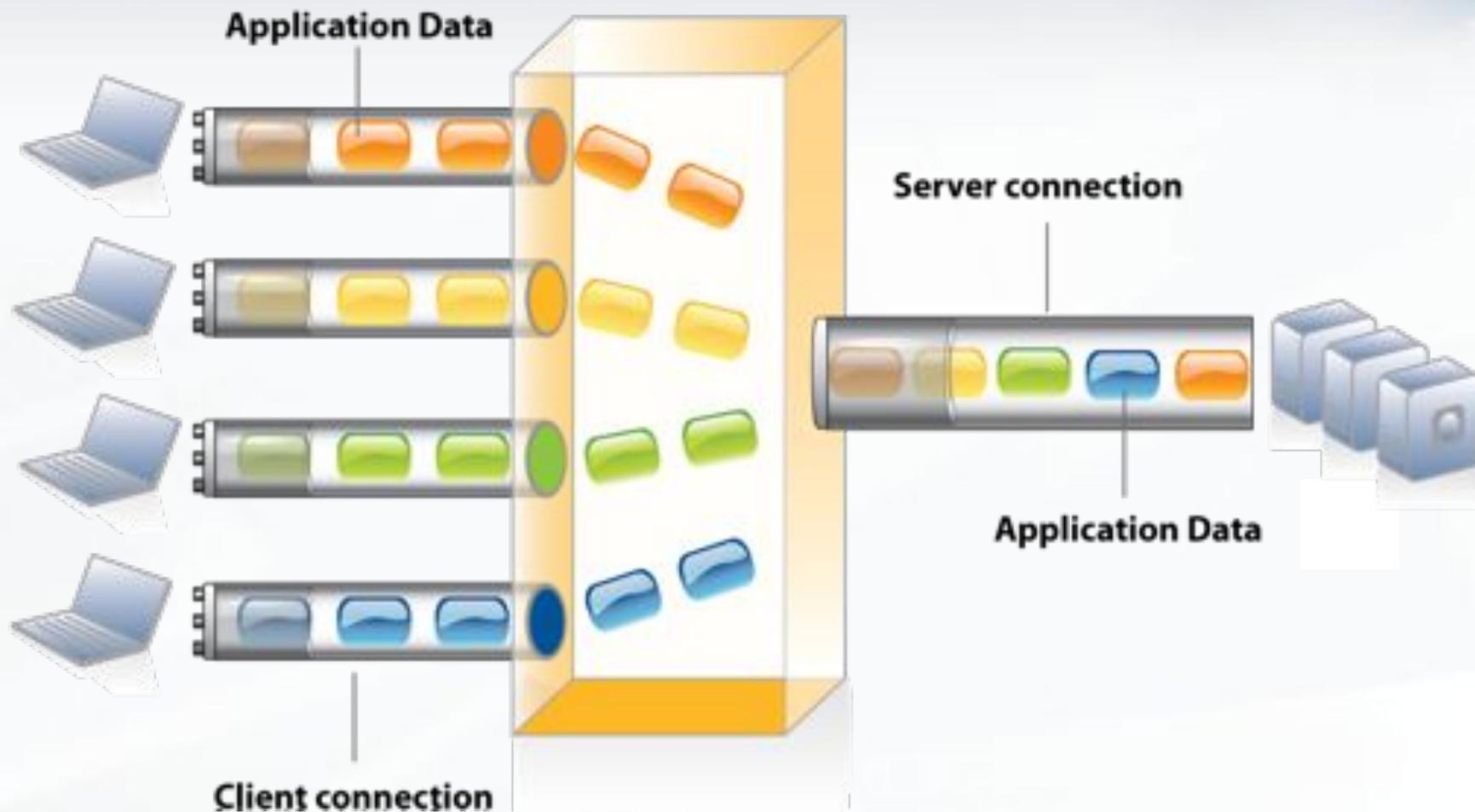
- ◆ Provide Automated DR switchover between Data Centres/Offices (**reduced downtime**)
- ◆ Better utilize DR equipment for active active Data Centres (**reduced capital expenditure for growth**)

The logo for SSMP, rendered in a large, metallic, 3D-style font with a blue and silver gradient and a shadow effect.

➤ Full performance of AX unit included

- ◆ Reduced capital expenditure at project start

TCP Connection Reuse



So What?

► **Connection Reuse Included**

- ◆ Reduce TCP Session handling load on servers
- ◆ Average server CPU load reduction = **30%**
- ◆ Offering either:
 - ◇ 30% Less Servers, Rack Space, Power, Cooling, Server licenses (**reduced operating costs**)
 - ◇ OR
 - ◇ 30% More customers, connections, orders with the same equipment (**reduced capital expenditure for growth**)

ACOS

SSMP

Compression



- HTTP & HTTPS
- Compatible with all modern day web browsers
- Reduce the amount of data and being sent to the client
- Offload compression from the servers
- Especially beneficial for remote/mobile workforce or customers

So What?

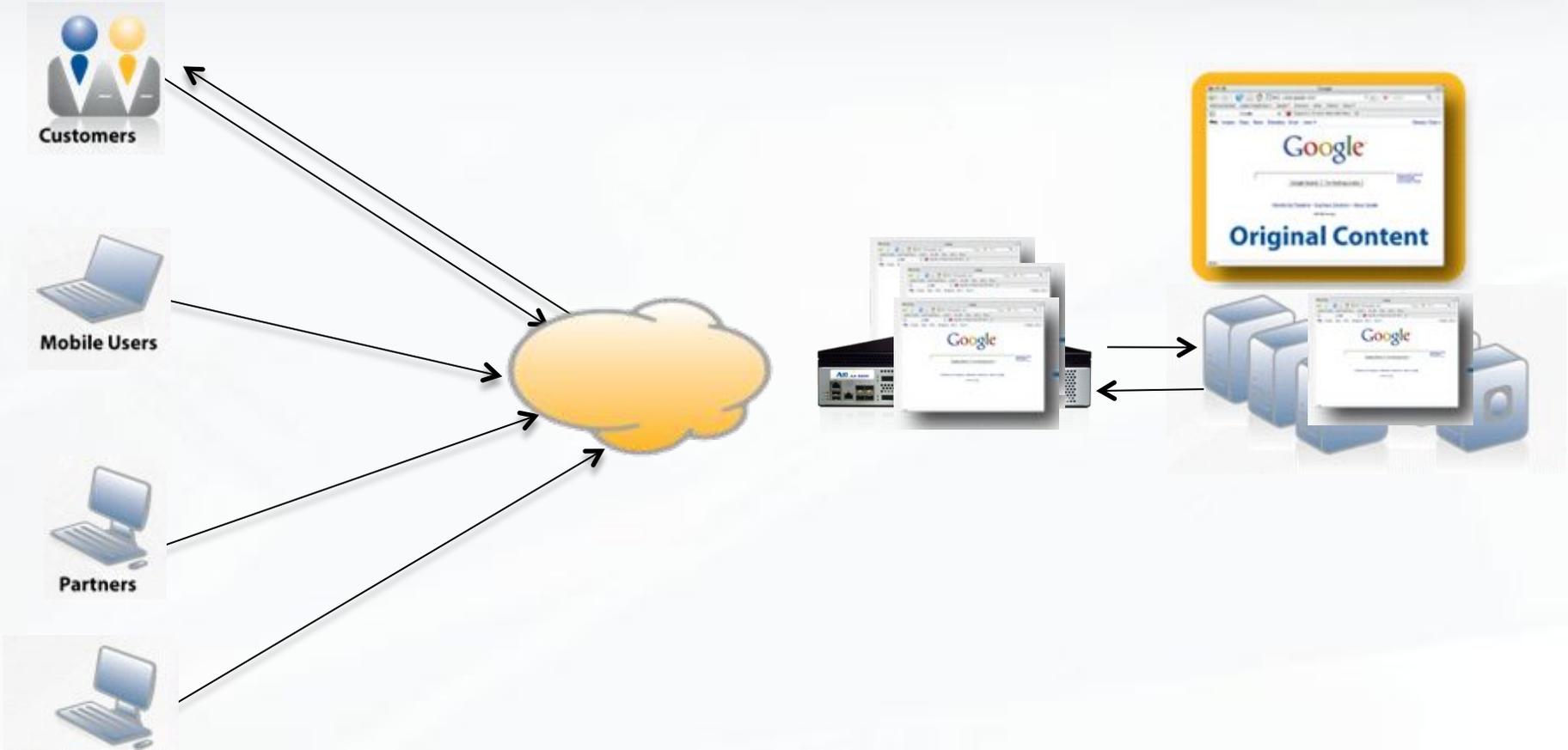
► **Compression Included**

- ◆ Reduce the amount of data to each user by average of **60%**
- ◆ Faster page loads
- ◆ Reduction in bandwidth requirements
- ◆ Offering either:
 - ◇ 60% Less bandwidth (**reduced operating costs**)
 - ◇ OR
 - ◇ 60% More customer requests and downloads with the same bandwidth (**reduced capital expenditure for growth**)

ACOS

SSMP

Static and Dynamic Caching



So What?

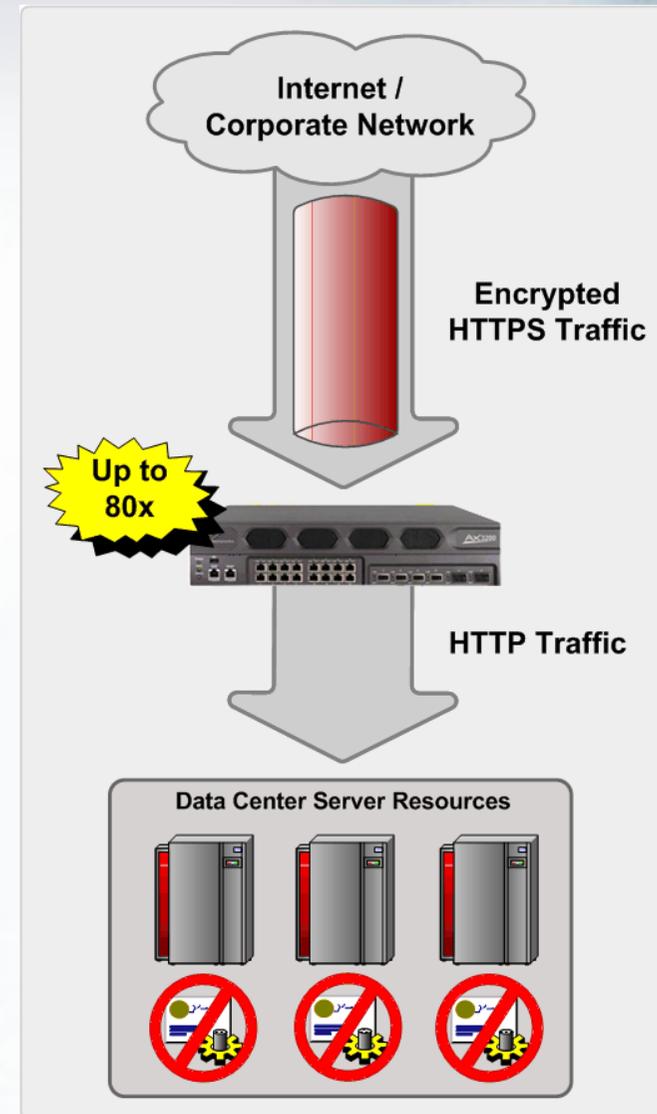
▶ **RAM Caching Included**

- ◆ Reduce content serving load on servers for commonly used objects
- ◆ Faster page loads as content served from AX RAM and not server disk
- ◆ Average server CPU load reduction = **10%**
- ◆ Offering either:
 - ◇ 10% Less Servers, Rack Space, Power, Cooling, Server licenses (**reduced operating costs**)
 - ◇ OR
 - ◇ 10% More customers, connections, orders with the same equipment (**reduced capital expenditure for growth**)

The logo for ACOS, rendered in a large, metallic, blue and silver 3D font with a beveled edge and a slight shadow.The logo for SSMP, rendered in a large, metallic, blue and silver 3D font with a beveled edge and a slight shadow.

High Performance SSL Acceleration

- Hardware based SSL Processing
 - ◇ SSL session terminated on AX in Hardware
 - ◇ Sent to servers either in the clear (HTTP) or re-encrypted (HTTPS)
 - ◇ Ability to reduce cipher spec on back end
- Central Certificate Management
 - ◇ Server certificates stored on AX instead of each server
 - ◇ Simplify certificate management



So What?

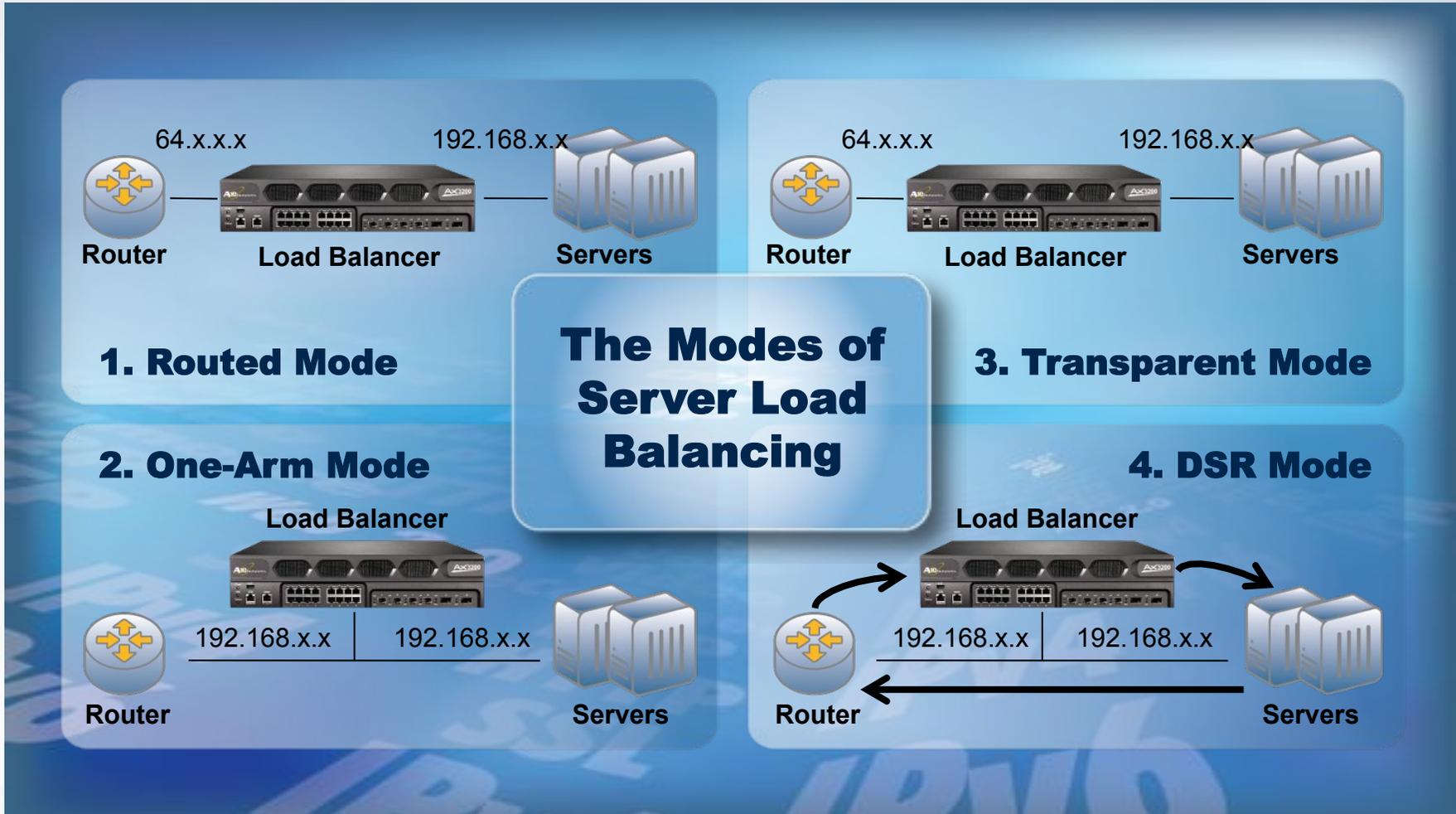
➤ SSL Offload Included

- ◆ Reduce encryption CPU load from servers
- ◆ One certificate required rather than one certificate per server = **reduced certificate cost**
- ◆ Ability to manipulate data at AX = reduction in server/application re configuration = **reduced operating cost**
- ◆ Average server CPU load reduction = **80%**
- ◆ Offering either:
 - ◆ 80% Less Servers, Rack Space, Power, Cooling, Server licenses (**reduced operating costs**)
 - ◆ OR
 - ◆ 80% More customers, connections, orders with the same equipment (**reduced capital expenditure for growth**)

ACOS

SSMP

Deployment Considerations





Products

AX Series Appliances

Enterprise Class Systems

32-bit



AX 1000
Throughput: 4 Gb

64-bit



AX 2500
Throughput: 10 Gb



AX 3000-GC
Throughput: 24 Gb



AX 2600-GC
Throughput: 18 Gb

Carrier Class Systems

32-bit



AX 2200
Throughput: 7.4 Gb



AX 3200
Throughput: 8.7 Gb

64-bit



AX 5100
Throughput: 40 Gb



AX 5200
Throughput: 40 Gb

AX Series Enterprise Class Performance Chart

A10

AX Series



	AX 1000	AX 2500	AX 2600	AX 3000
Application Throughput	4 Gb	10 Gb	18 Gb	22 Gb
Layer 4 CPS	153,000	300,000	355,000	440,000
Layer 7 RPS (unlimited CR)	275,000	700,000	740,000	800,000
DDoS Protection (SYN Flood) SYN/Sec	1 million	2.1 million	2.3 million	2.6 million
SSL CPS	5,500	7,900	11,000	11,000
SSL TPS (10 transactions/conn)	18,000	57,000	85,000	85,000
SSL Bulk Throughput	1.2 Gb	1.2 Gb	2 Gb	2 Gb

AX Series Carrier Class Performance Chart



AX Series

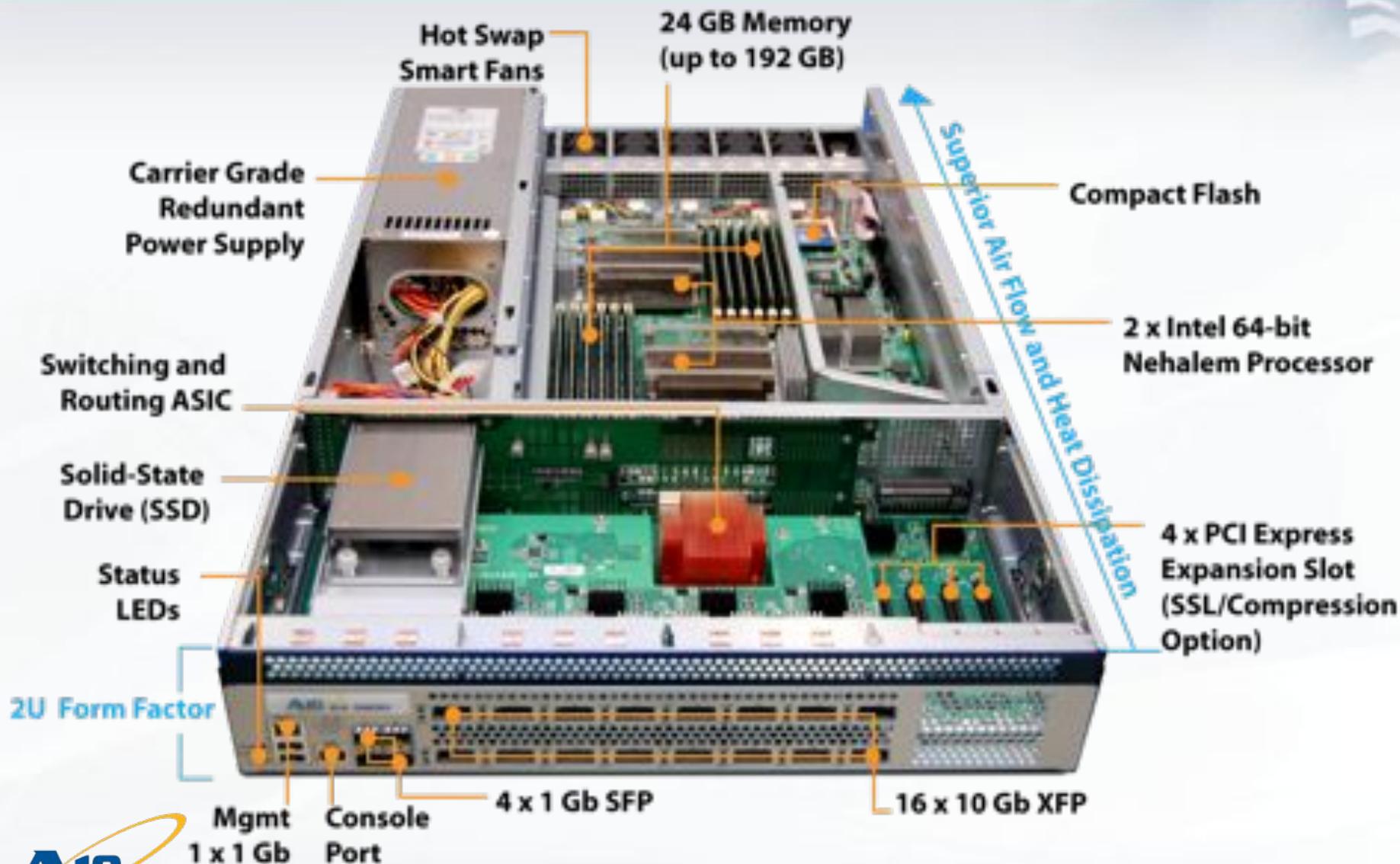


	AX 2200	AX 3200	AX 5100	AX 5200
Application Throughput	7.4 Gb	8.7 Gb	40 Gb	40 Gb
Layer 4 CPS	302,000	541,000	2,000,000	3,020,000
Layer 7 RPS (unlimited CR)	750,000	1,507,000	1,400,000	3,200,000
DDoS Protection (SYN Flood) SYN/Sec	5.6 million*	9.24 million*	50 million*	50 million*
SSL CPS	16,000	29,000	Option	Option
SSL TPS (10 transactions/conn)	45,000	90,000	Option	Option
SSL Bulk Throughput	1.3 Gb	2 Gb	Option	Option

* 0% CPU utilization

AX 5200 Hardware Overview

A10





AX Series DNS Application Firewall

Browser and DNS Interaction are Changing

► Example:

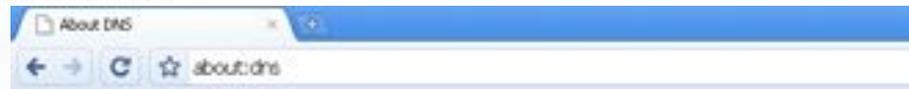
- ◆ Google Chrome - <http://blog.chromium.org/2008/09/dns-prefetching-or-pre-resolving.html>



Google Chrome

• DNS pre-fetching

DNS pre-fetching stands for Domain Name System pre-fetching. When you visit a webpage, Google Chrome can look up, or pre-fetch, the IP addresses of all links on the webpage. Browsers use the IP address to load a webpage, so by looking up this information in advance, any links you click on the webpage will load faster.



Prefetching DNS records produced benefits for 13 hostnames

Host name	Applicable Prefetch Time (ms)	Recent Resolution Time(ms)	How long ago (HH:MM:SS)	Motivation
www.twitter.com	29	0	03	[omnibox]
www.facebook.com	245	0	15	[omnibox]
www.ebay.com	166	0	29	[omnibox]
gcr04.revsci.net	100	0	43	www.cnn.com
cnn.dyn.cnn.com	86	0	58	www.cnn.com
www.cnn.com	68	0	01:00	[page scan]
m1.2nda.net	40	0	01:04	ad.doubleclick.net
www.shopping.com	33	0	01:05	[omnibox]
www.intel.com	35	0	03:04	[omnibox]

Problem 1: Increased DNS Infrastructure Pressure



Single DNS Request



DNS Request and
DNS Prefetch



Problem 2: Distributed DDoS Attacks on DNS Infrastructure



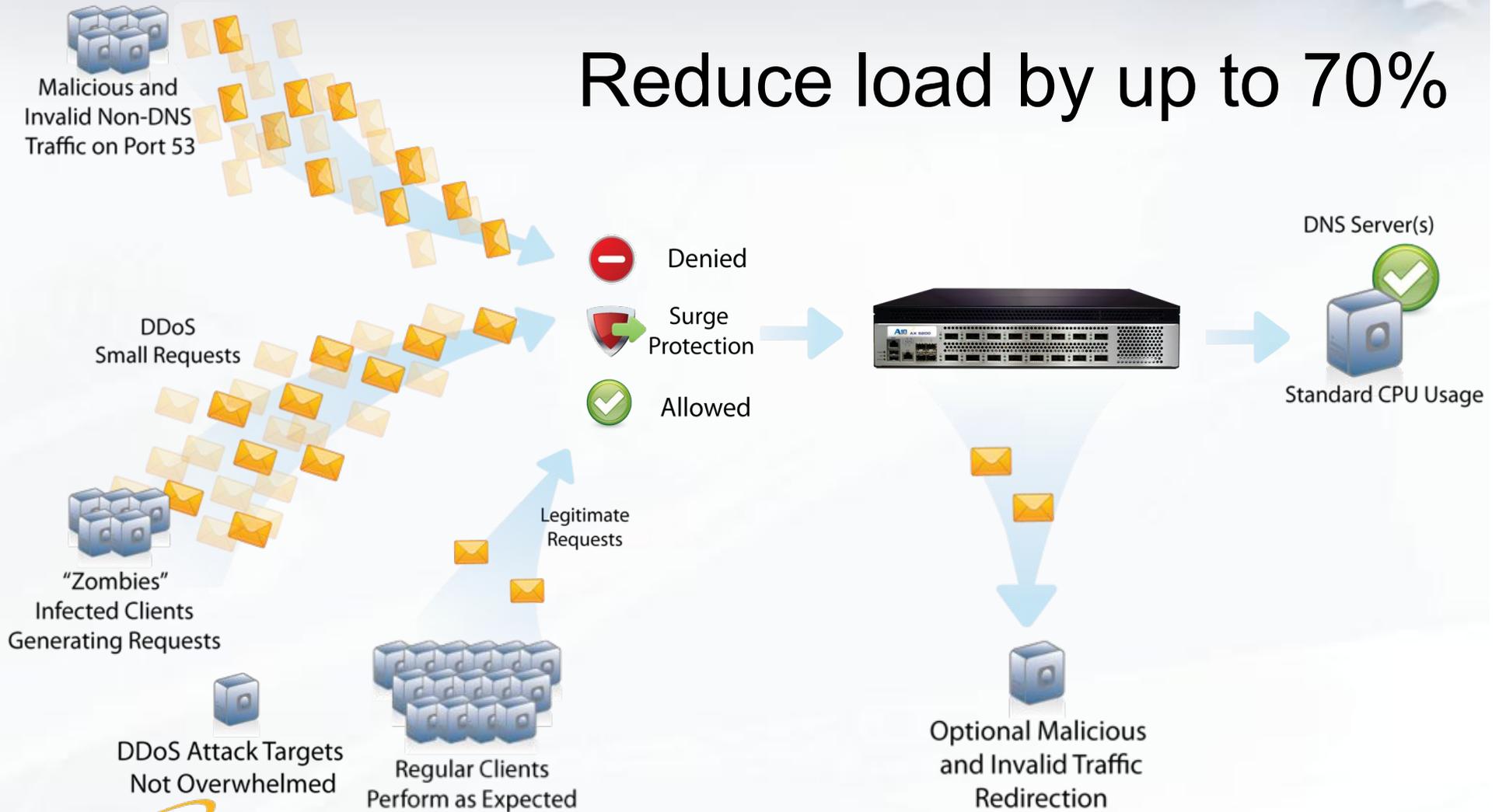
Problem 3: Malicious and Invalid Traffic Hitting DNS Infrastructure



Solution: AX Series DNS Application Firewall

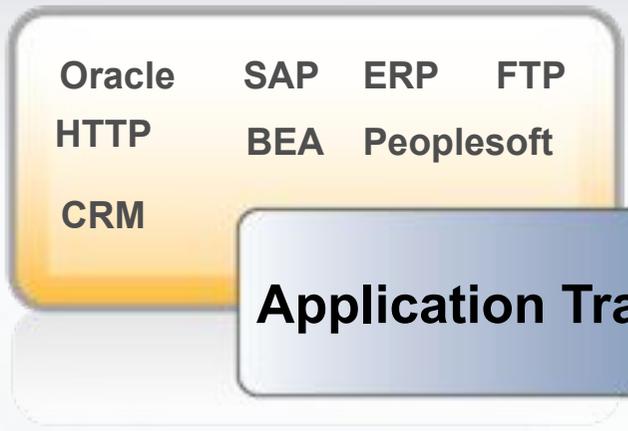


Reduce load by up to 70%

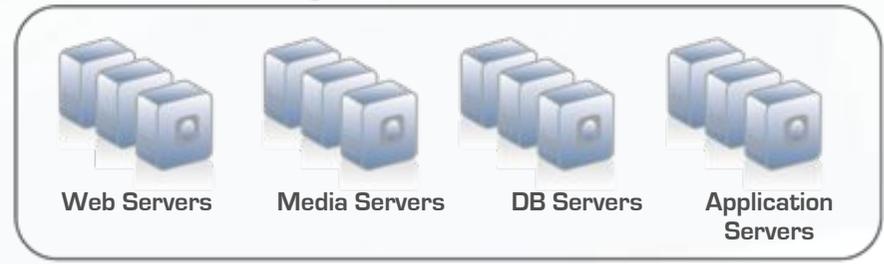


aFleX

Layer 7 Scripting: aFleX



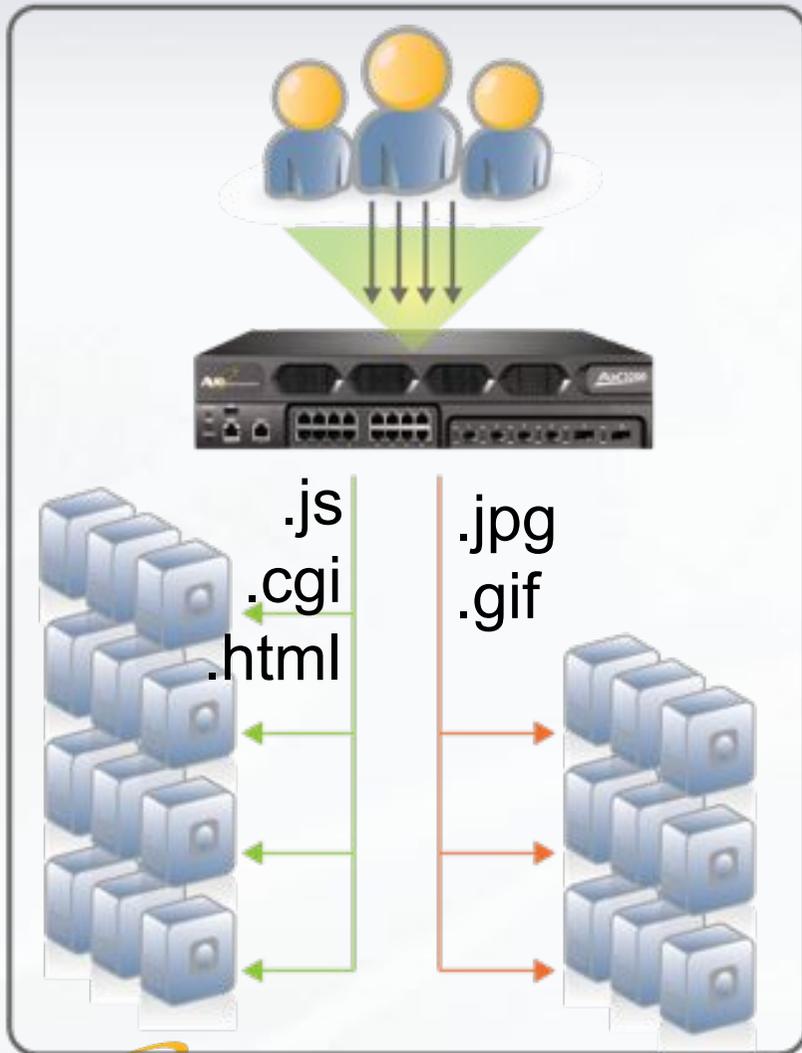
Intelligent load balancing with policies



- Looks into application traffic flow to identify decision criteria
- Based on standard scripting languages for ease of use
- Easy to transfer scripts from other load balancing solutions

Net Effect: flexible management without performance degradation

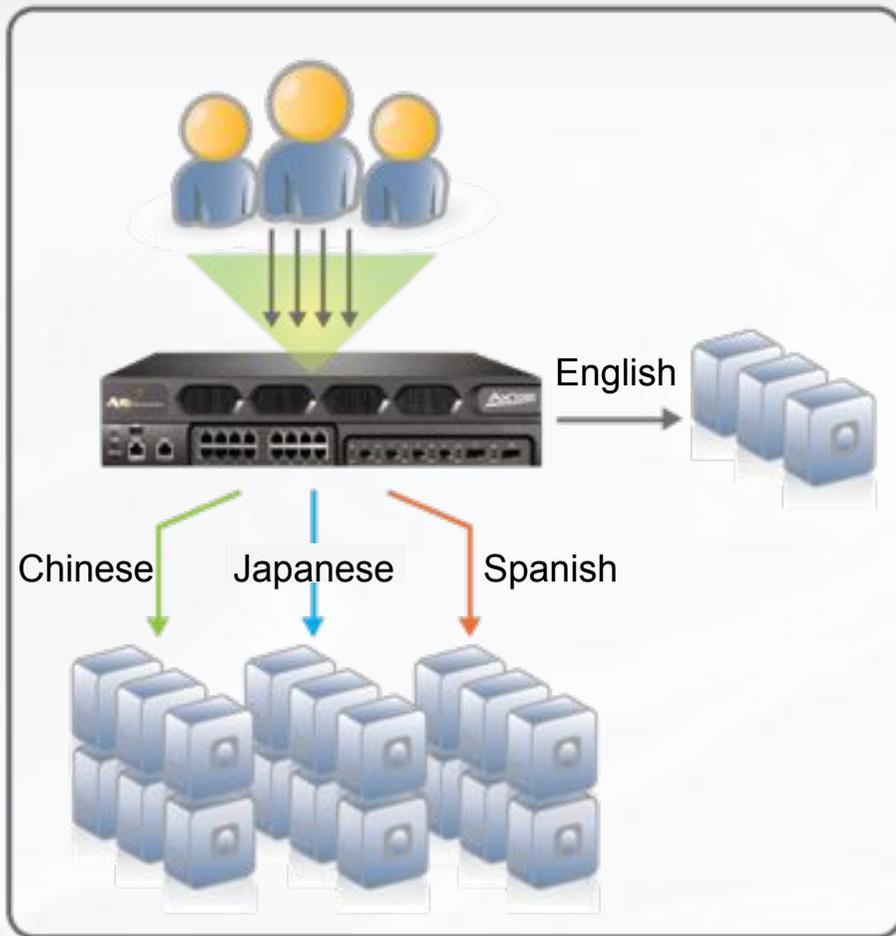
aFlex : Reallocate requests by content type to optimize data center resources



Transparent to the user, splits requests for static images (jpgs and gifs) to a separate caching server tier.

```
when HTTP_REQUEST {  
  if { [HTTP::uri] ends_with "jpg" } {  
    pool cache  
  
  } elseif { [HTTP::uri] ends_with "gif" } {  
    pool cache  
  
  } else {  
    pool web  
  }  
}
```

aFlex : Automatically provide content in the user's language



Automatically displays a Web page based on the user's language, using the language set in the user's browser.

```
when HTTP_REQUEST {  
  if { [HTTP::header accept-language] contains  
    "es" } {  
    pool Spanish  
  } elseif { [HTTP::header accept-language]  
    contains "ja" } {  
    pool Japanese  
  } elseif { [HTTP::header accept-language]  
    contains "zh" } {  
    pool Chinese  
  } else {  
    pool English  
  }  
}
```

aFlex : Provide easy to remember URLs



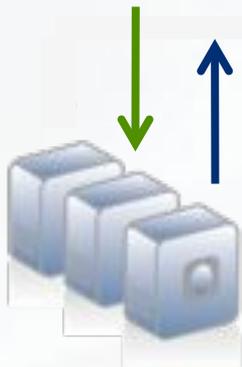
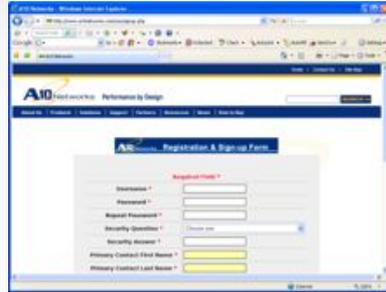
Hides the complex directory structure of the backend Web server by using a short and easy to remember URL. Also facilitates a mechanism for fast back end directory changes transparently to the user.

```
when HTTP_REQUEST {  
  
    if { [HTTP::uri] starts_with "/sales" } {  
  
        HTTP::uri "/htdocs/usa/start/dept/  
sales"  
  
    } elseif { [HTTP::uri] starts_with "/ship" } {  
  
        HTTP::uri "/htdocs/usa/start/dept/  
shipping"  
    }  
}
```

aFlex : Provide easy way to re-direct URLs

//www.A10networks.com

//www.A10networks.com/oss/signup.php



www.A10networks.com

www.A10networks.com/oss/signup.php

Provides a simple way to provide redirect:
In this example users are redirected from www.A10networks.com to www.A10networks.com/oss/signup.php

when HTTP_REQUEST {

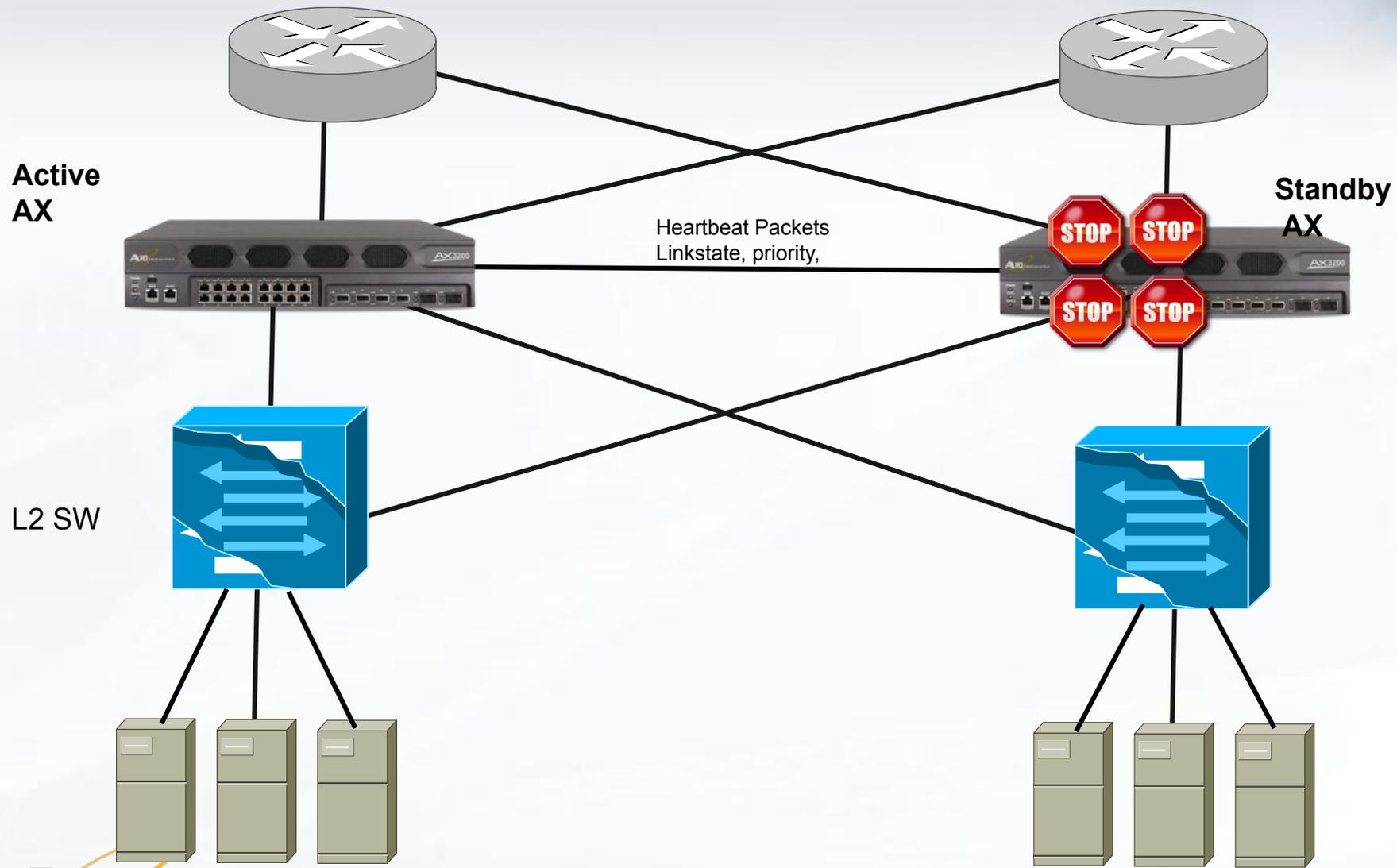
if { [HTTP::uri] equals "/A10" } {

HTTP::redirect [http://\[HTTP::host\]/oss/signup.php](http://[HTTP::host]/oss/signup.php)

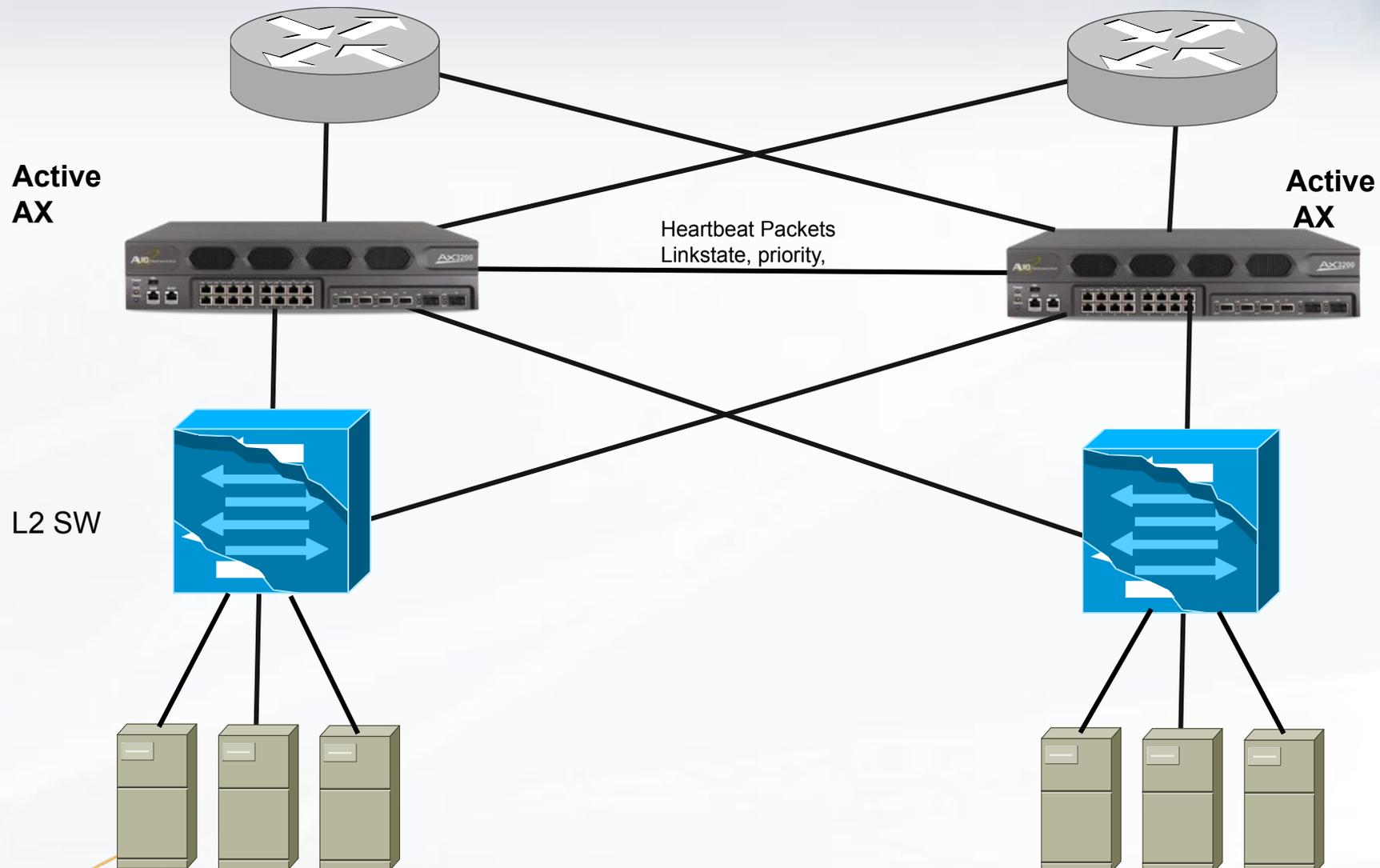
}

}

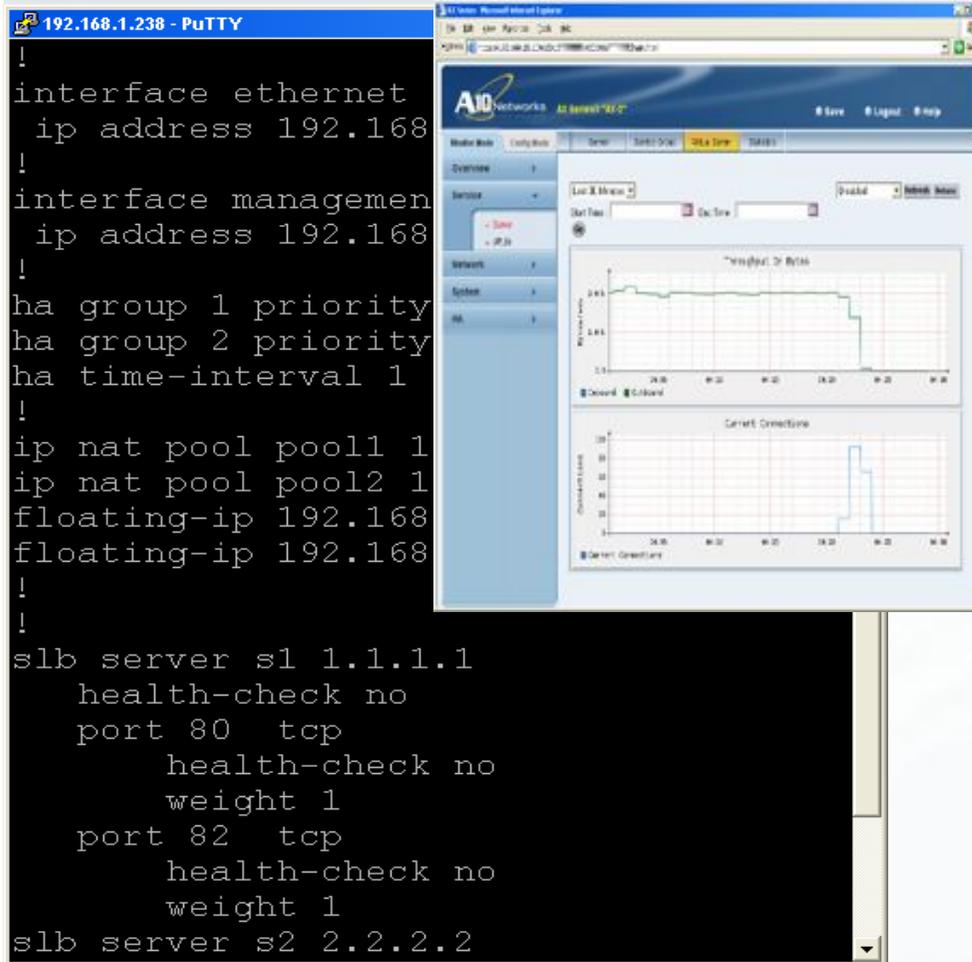
Intelligent HA configuration Active-Standby



Intelligent HA configuration Active-Active



Manageability



The image shows two overlapping windows. The left window is a PuTTY terminal displaying network configuration commands for an A10 device. The right window is a web-based GUI for A10 Networks, showing a monitoring dashboard with two line graphs: 'Throughput (K Bytes)' and 'Current Connections'.

```
!
interface ethernet
 ip address 192.168
!
interface management
 ip address 192.168
!
ha group 1 priority
ha group 2 priority
ha time-interval 1
!
ip nat pool pool1 1
ip nat pool pool2 1
floating-ip 192.168
floating-ip 192.168
!
!
slb server s1 1.1.1.1
 health-check no
 port 80 tcp
   health-check no
   weight 1
 port 82 tcp
   health-check no
   weight 1
slb server s2 2.2.2.2
```

➤ Flexible Configuration

- ◆ Cisco Like CLI
- ◆ Simple to use GUI
- ◆ Linux based Control Kernel

➤ Powerful External Healthchecks

- ◆ Python, Perl, TCL, Bash
- ◆ Multi Layer

➤ aFleX

- ◆ TCL based Application Control

➤ aXAPI

- ◆ REST Format
- ◆ Quicker implementation than SOAP
 - ◆ Less code
 - ◆ Less complex
 - ◆ Easier to understand/support

Config mode

A10 Networks AX2000 Save Logout Help

Monitor Mode **Config Mode** Service Group Virtual Server Server Auto Translation

Service

- Template
- Health Monitor
- Policy
- **Server**
- Firewall
- GSLB
- aRule
- IP Source NAT
- SSL Management

Network **System** **HA**

Service Group

Name: * Service_HTTPS_Grp1

Type: TCP

Algorithm: Round Robin

Health Monitor: HTTPS

Server: 192.168.30.100 Port: 636 Weight: 70 Add

Connection Limit: 80000 Priority: 2 Edit

<input type="checkbox"/>	Status	Server	Port	CL	W	P	Delete
<input type="checkbox"/>	✓	192.168.1.1	80	10000	30	2	Enable
<input type="checkbox"/>	✓	192.168.30.100	636	80000	70	2	Disable

Member:

Monitor mode

The screenshot displays the A10 Networks AX2000 web interface in Monitor Mode. The top navigation bar includes the A10 Networks logo, the model name AX2000, and the status HA: Not-Configured. There are also buttons for Save, Logout, and Help. The interface is divided into several sections:

- Monitor Mode / Config Mode / Summary:** The current view is the Summary page.
- Overview:** A sidebar menu with options for Summary, Status, Statistics, and Performance.
- Service, Network, System, HA:** Additional sidebar menu items.
- Advanced Traffic Manager:** A status bar at the top of the main content area with a Refresh button.
- System Information:**
 - Serial Number: AX20001107200003
 - Current Time: 05:51:08 CDT Fri Mar 14 2008
 - Startup Mode: System started from: hard disk primary
 - Software Version: 1.2.1(build: 252)
 - Advanced Core OS: Primary/Secondary
 - On Hard Disk: 1.2.1(build: 252)/1.2.1(build: 71)
 - On Compact Flash: 1.2.1(build: 71)/1.2.1(build: 71)
 - Firmware Version: N/A
 - aRule Engine Version: 1.0.0
 - Last Config Saved At: 11:25:27 CDT Thu Mar 13 2008
- Feature Configuration:**
 - Virtual Servers: 4
 - Servers: 1
 - Firewall Virtual Servers: 1
 - Firewall Nodes: 2
 - GSLB Sites: 2
 - GSLB Zones: 1
 - PB/SLB: 0
 - aRule: 0
 - SSL Acceleration: On
 - High Availability: Off
 - Connection Mirror: Off
- Device Information:**
 - CPU Count Status: 4 / All OK
 - Memory Usage: 1249 / 2023 MB
 - Disk Usage: 0 / 75 GB
 - CPU Temperature: 40C / 104F
 - Fan Status: Fan1:2010, Fan2:2010, Fan3:2481 (RPM)
 - Power Supply: Lower: off, Upper: on
 - Technical Support: <http://www.a10networks.com/usa000>

Virtualized Management - "Shared SLB"



- Each Administrator can see only the allocated SLB resources
- Up to 128 Partitions
- Graceful Shutdown
- Slow Start

Welcome to the New Generation: Don't Be Left Behind

A10



AX Series Advanced Traffic Manager
New Generation Server Load Balancer

Performance by Design

www.a10networks.com

- Higher Performance
- Lower Price
- Better Support