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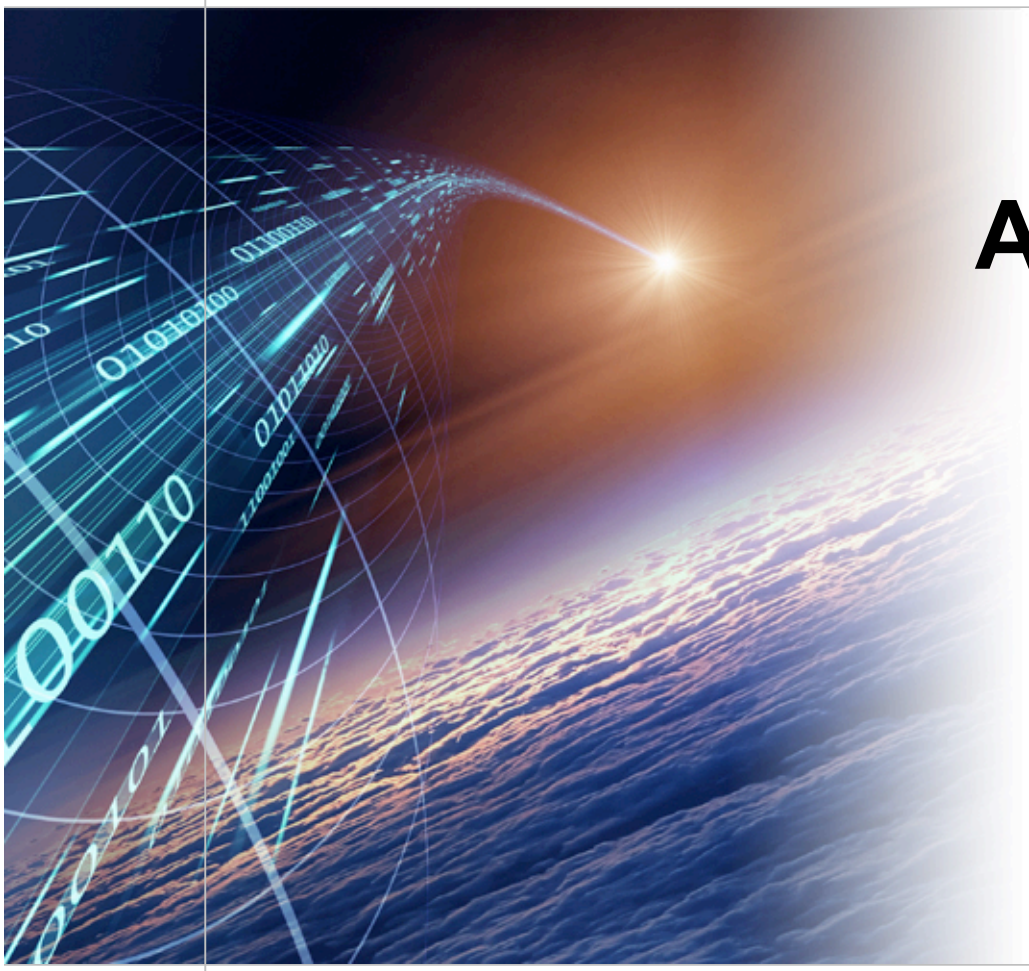
Customer Success Is Our Mission



An SOA Alternative to CORBA

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The PEO-C4I Believes That XSLT Can Be Used To Interconnect SOA Systems

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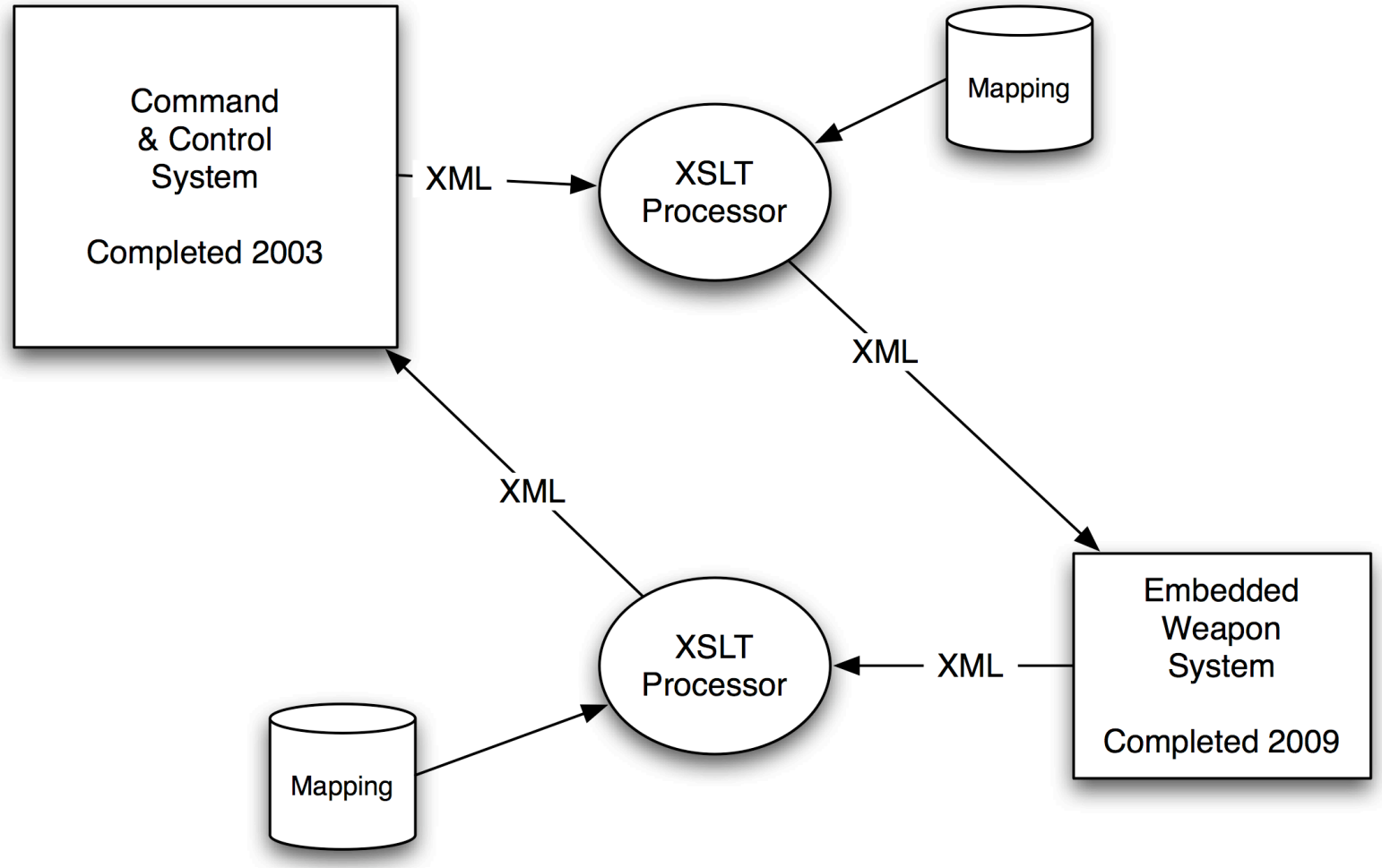

CORBA Does Not Achieve Inter-Operability Goals

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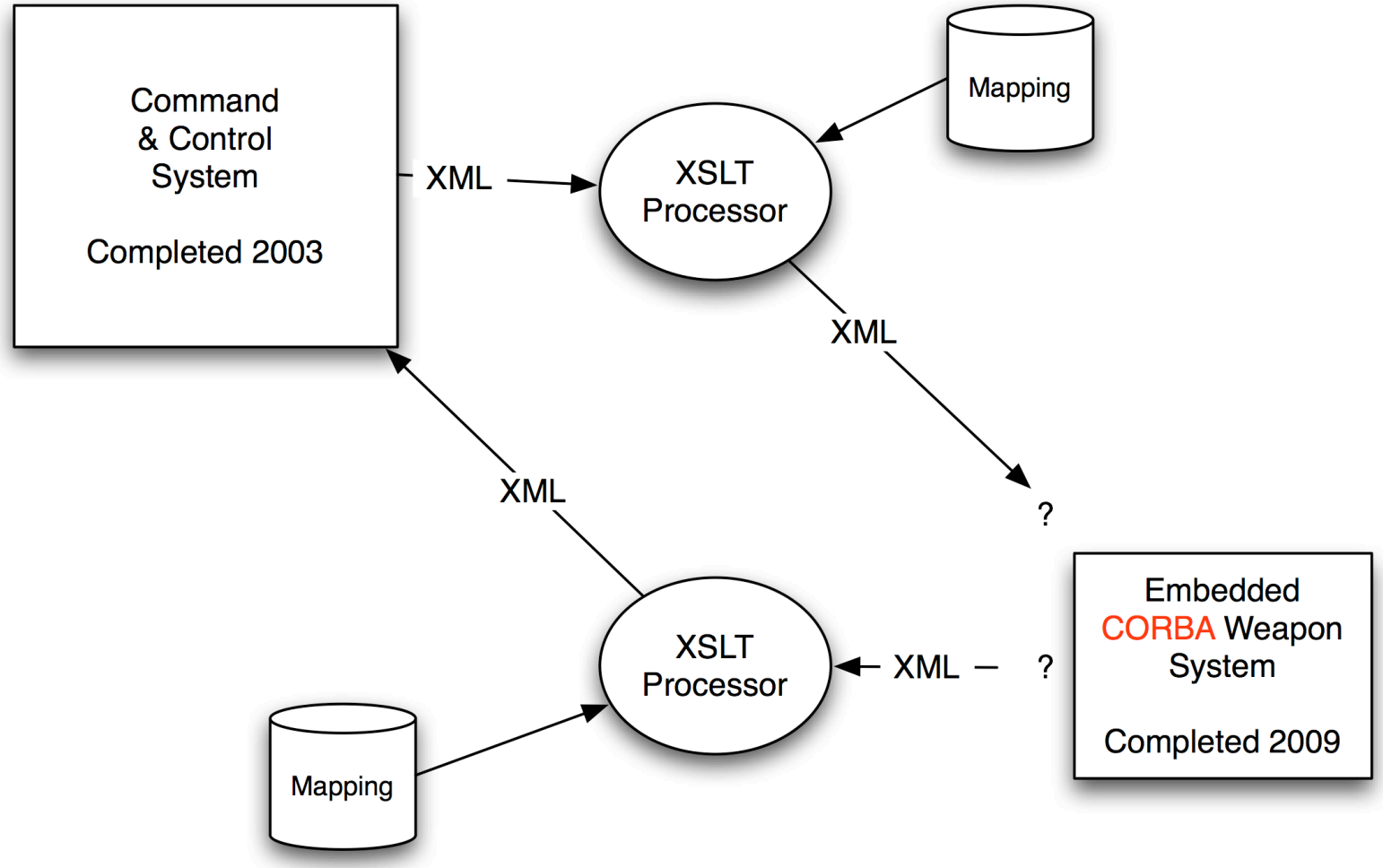

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Top-Level CORBA/SOA Comparison

	CORBA	SOA
Protocol	Binary	Text (could be binary)
Interface code	Gen from IDL	XML Parser (More Later)
Service Location Specification	IOR	Web Address
Reliability	Yes	Yes
Available for GPPs	Yes	Yes (Topic of this presentation)
Available for DSPs and FPGAs	Yes	No

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SOA Strategies That Were Considered

- Use OMG CORBA C++ to WSDL Standard
- Use and Implementation of Universal Plug-N-Play (UPnP)
- Use gSOAP (from Florida State University)

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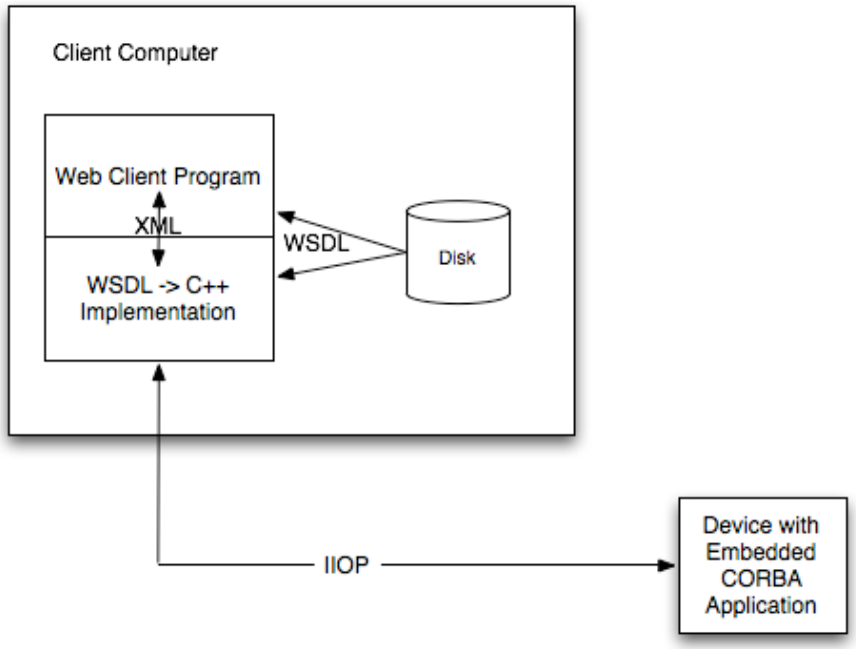
Strategy 1: CORBA C++ to WSDL

- OMG Standard
  - formal/06-11-01
- Defines how to translate IDL to WSDL
- Assumes the existence of a web server that can translate XML ← → IIOP
- Web client thinks it is using a set of messages defined in WSDL
- CORBA server thinks it has a CORBA client



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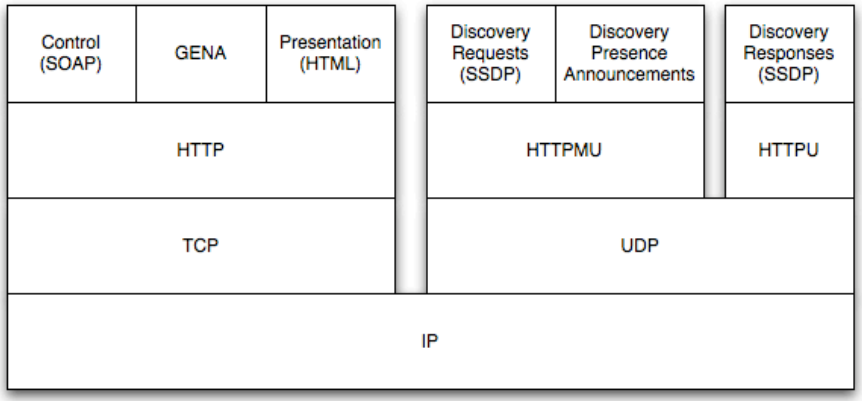
Strategy 2: UPnP

- Universal Plug-n-Play
- Standard controlled by UPnP Forum (www.upnp.org)
  - Several standardized XML Schemas
    - Internet Gateway Device
    - Printer Device
    - Home heating and cooling (HVAC)
    - Digital Security Camera
    - Lighting Controls
- Originally Proposed by Microsoft
  - Commands to find a shared disk use UPnP
  - Some commercial disk drives support UPnP so that Microsoft can find them
    - LaCie
- Open Source Implementation provided by Intel
- Commercial Implementations Available
  - Jungo
  - Allegro

UPnP Stack



HTTPMU: HTTP over Multicast
HTTPU: HTTP over Unicast UDP
SSDP: Simple Service Discovery Protocol
GENA: Generic Event Notification Architecture

UPnP Continued

- Device
  - Usually an embedded device
  - Anything that implements the device WSDL description
  - Contains one or more services
- Service
  - i.e., an SOA service
  - A feature of a device
    - Volume control
    - TV picture contrast
- Control Point
  - An application that controls a device by using its services

Zeroconf

- International (IETF) Standard
  - To get a unique IP address when a DHCP server not present
    - RFC-3927
  - Multicast DNS
    - RFC 1995, 1996, 2136, 2181
  - Service Discovery
    - RFC-2782
- Binary Protocol
  - Based on DNS
- Wider support
  - Especially among printers

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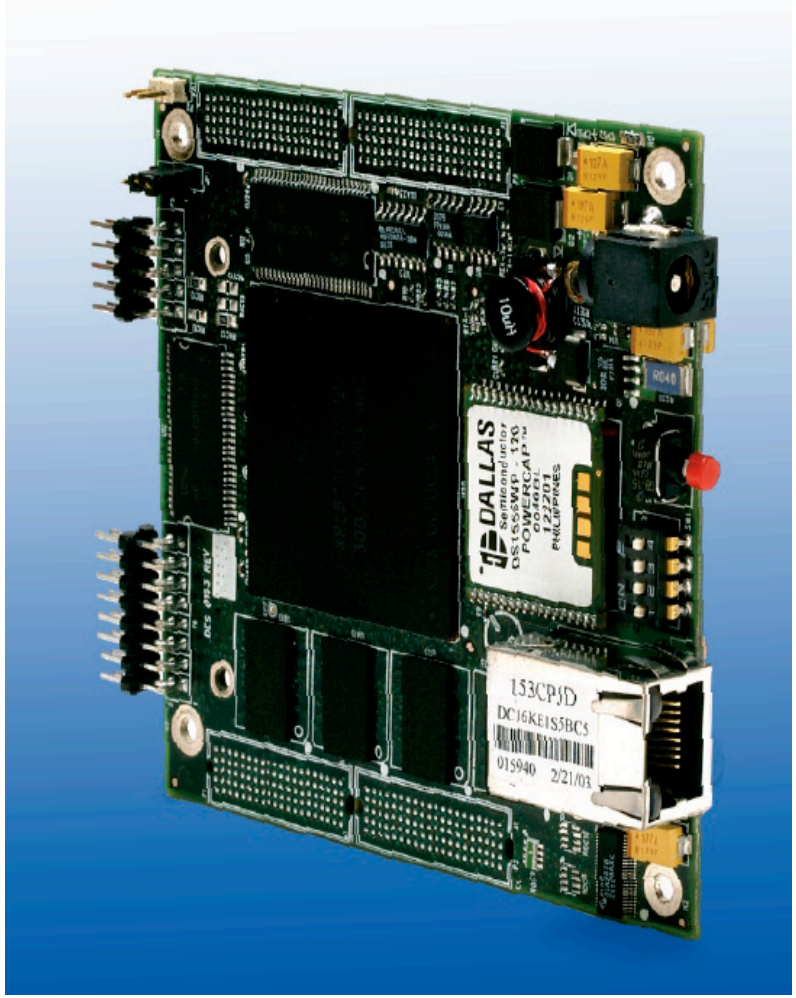
Strategy 3: gSOAP

- Open source client/server implementation that is compliant with SOA and web servers
- Programming paradigm very similar to CORBA
  - Has a tool that generates stubs and skeletons
    - Input can be a ".h" file or a WSDL file
  - Stubs and Skeletons send/receive SOAP messages instead of IIOP
- Faster and smaller than a general purpose web server
  - Do not need a general purpose XML parser
  - Stubs and Skeletons are customized for the defined set of messages

This is the strategy that was explored

Using gSOAP and CORBA on an EP8260

- A non-rigorous experiment was held with gSOAP and CORBA
- The target EP8260 consisted of the following:
  - VxWorks version 5.5
  - 604 PowerPC
  - 64MB SDRAM
  - 32MB Flash
  - 10/100BaseT Ethernet connection
  - RS-232 Serial port
  - UTOPIA 8, UTOPIA 16, Fast Ethernet supported simultaneously via EP S bus



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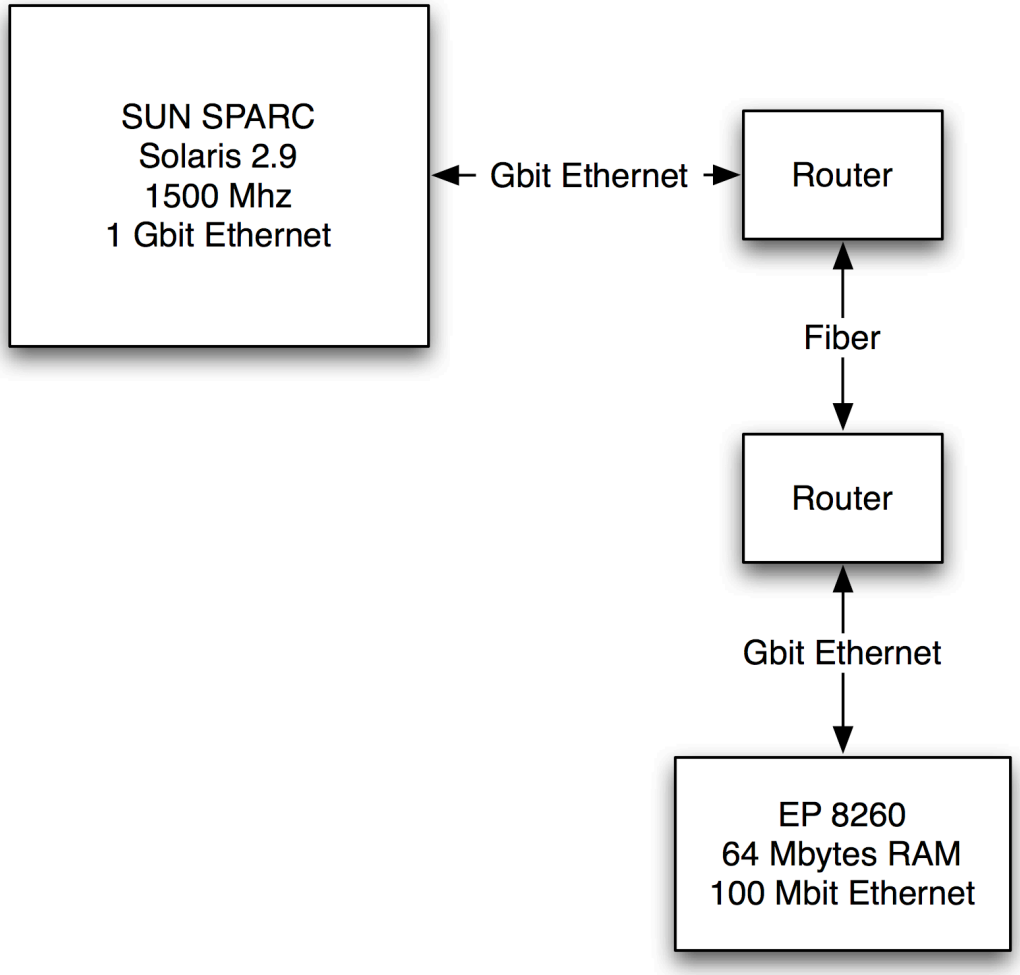
Test Network



Some Comparisons

- Size
  - gSOAP
    - 288,295 bytes
  - OIS CORBA
    - 859,512 bytes
    - ORB is 2,070,500 bytes
- Speed round-trip send 2 floats and receive 1 float response
  - gSOAP
    - 4,302 uSecs
  - OIS CORBA
    - 756 uSecs

CORBA is 3x bigger and 5.7x faster than gSOAP (in this case)

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Conclusion

- There are 3 viable strategies for making an embedded web server
  - If you can avoid real-time constraints
- Strategy 1: OMG C++ to WSDL mapping
  - Advantage: no modifications necessary to the embedded device
  - Disadvantage: imposes an XML ← → IIOP on the client
- Strategy 2: UPnP
  - Several commercial implementations
  - Several standardized XML schemas
  - Uses a general purpose XML parser
  - Open source implementation is designed for Linux (doesn't work on VxWorks)
- Strategy 3: gSOAP
  - Development environment is similar to CORBA
    - Stubs
    - Skeletons
    - Interface Definition can be a ".h" file or a WSDL file

SOA is coming to an Embedded Device near You