Service Oriented Architectures (SOA) and Net-Centric Warfare: Similarities, Differences and Conflicts

NDIA 11th Annual Systems Engineering Conference

22 October 2008

by

James Mazzei, James Ayers and Camille Keely
james.a.mazzei@aero.org
james.l.ayers@aero.org

© The Aerospace Corporation 2008

Outline

- Introduction
- Objectives of SOA
- Advantages & Implementations of SOAs
- Objectives of Net-Centric Warfare
- Implementations of Net-Centric Warfare
- Common Features
- Fundamental Considerations
- Baseline Architecture Questions
- Conclusions

Introduction

SOAs provide agility by giving users:

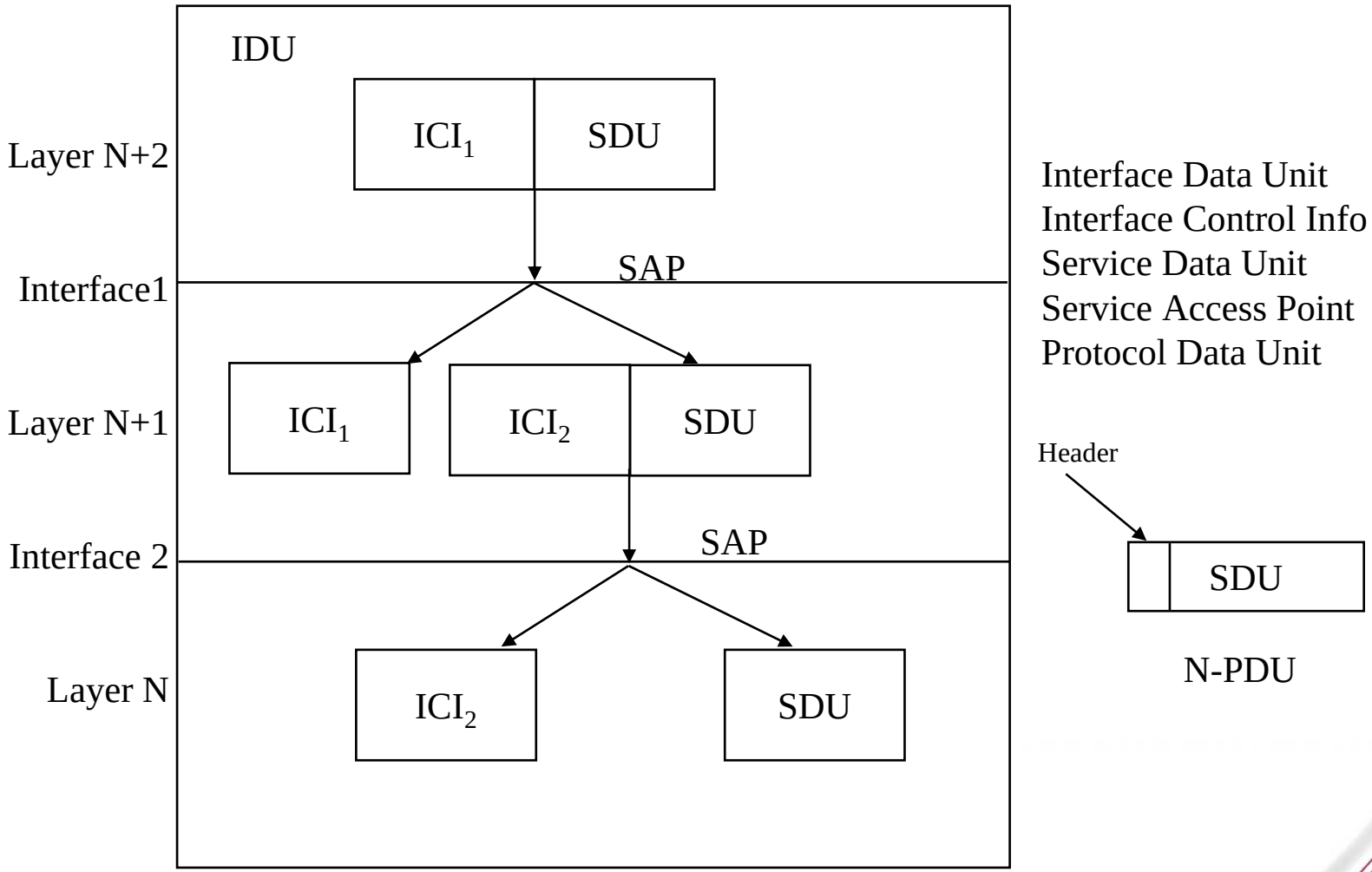
- Open & interoperable system design
- A structure for problem & requirement resolution
- Common best practices & systems engineering techniques
- Consistency across the industry
- A vehicle for sharing strategies and proven approaches

Objectives of SOA

SOA’s principal objectives are to provide:

- Application reuse
- Fast response to business needs

Advantages & Implementations of SOA



Objectives of Net-Centric Warfare

Net-Centric Warfare's Holy Grails:

- Timeliness
- Availability
- Throughput

Implementations of NCW

IP
Asynchronous Transfer Mode (ATM)
SONET/SDH
Interface for OTN, G.709
Optical Fiber/OTN (WDM)

Common Features

Both SOAs and Net-Centric Warfare require:

- Stable Requirements
- Correlation of Disparate Stakeholders
- Strong Management

Fundamental Considerations

IP Layer	OSI Layer	SONET Layer	ATM Layer	ATM Sublyr	Functionality
	3/4		AAL	CS	Providing standard interface
				SAR	Segmentation and reassembly
4	2/3	2	ATM		Flow control Cell header generation & extraction Virtual circuit path management Cell multiplexing & demultiplexing
3	2		Phys	TC	Cell rate decoupling, Cell generation, header, Checksum, Frame generation, Packing and unpacking cells from enclosing envelope
	1	1	Phys	PMD	Bit timing and physical network access

Baseline Architecture Questions

- Should Architecture Be Software Based?
- Is an Enterprise Service Bus Appropriate?
- Should the SOA Be Implemented By a Single Vendor/Integrator?

Conclusions

- The SOA can either compliment or impede Net-Centric Principles
- Implementations should be pursued with adequate prototyping and testing

Abbreviations

- AAL – ATM Adaptation Layer
- ATM – Asynchronous Transfer Mode
- CS – Convergence Sublayer
- ICI – Interface Control Info
- IDU – Interface Data Unit
- IP – Internet Protocol
- NCW – Net-Centric Warfare
- OSI – Open System Interconnection
- OTN – Optical Transport Network
- PDU – Protocol Data Unit
- PMD – Physical Medium Dependent
- SAP – Service Access Point
- SAR – Segmentation and Reassembly
- SDH – Synchronous Digital Hierarchy
- SDU – Service Data Unit
- SOA – Service Oriented Architecture
- SONET – Synchronous Optical Network
- TC – Transmission Convergence
- WDM – Wave Division Multiplexing