NETWORK MANAGEMENT ARCHITECTURES

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PRESENTATION AT CAP-VOLMAC
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ORGANIZATION TIOS

ARCHITECTURE (VISSELS)
FORMAL METHODS (BRINKSMA)
TOOLS (ALBLAS)
QUANTITATIVE METHODS (NICOLA)
APPLICATION Protocols (MICHEILS)
COMMUNICATION Protocols (NIEMEGEERS)
TRANSMISSION (VAN ETTEN)
OPERATIONAL ASPECTS & MANAGEMENT (BAKKER)
OPERATIONAL ASPECTS & MANAGEMENT

MEMBERS:

• KEES BAKKER (PART-TIME PROFESSOR)
• AIKO PRAS (RESEARCHER)
• ERIC VAN HENGSTUM (SOFTWARE ENGINEER)
• HARRIE HAZEWINKEL (PROJECT RESEARCHER)
• MANY STUDENTS

PROJECTS:

• UT-SNMPv2 (internal)
• ATM MANAGEMENT (SURFNET-4)
• WWW MANAGEMENT (EC)
• HIERARCHICAL MANAGEMENT (EC?)
SNMPv2 PROJECT

WHY SUCH PROJECT?

• GET PRACTICAL EXPERIENCE
  
  • IMPROVE KNOWLEDGE OF PROTOCOL IMPLEMENTATION
  
  • IMPROVE EXTERNAL CONTACTS

WHY SNMPv2?

• EASY PARTICIPATION
  
  • MORE THAN PAPERWARE

RESULTS:

• RELEASE 4

• WORK HAS BECOME WELL-KNOWN WITHIN THE INTERNET COMMUNITY
**NETWORK MANAGEMENT ARCHITECTURES**

**THESIS:**

THERE IS NO PRINCIPLE DIFFERENCE BETWEEN THE DESIGN OF PRIMARY FUNCTIONS AND THE DESIGN OF MANAGEMENT FUNCTIONS
NETWORK MANAGEMENT ARCHITECTURES

IMPLICATION:

IT SHOULD BE POSSIBLE TO MODEL BOTH KIND OF FUNCTIONS AS PART OF A SINGLE ARCHITECTURE
NETWORK MANAGEMENT ARCHITECTURES

existing approach

architecture for primary network functions

+ architecture for management functions

approach followed by my thesis

integrated architecture for primary & management functions
MANAGEMENT AS PART OF THE DESIGN PROCESS

User Requirements

- subset 1
- subset 1 + 2
- all

Initial Service
  - Initial protocol
  - First prototype

Revised Service
  - Revised protocol
  - Revised prototype

Final Service
  - Final protocol
  - Complete realization
MANAGEMENT AS PART OF THE DESIGN PROCESS

User Requirements

prototype
MANAGEMENT AS PART OF THE DESIGN PROCESS

User Requirements

- design
- first realization

operational phase

time
MANAGEMENT AS PART OF THE DESIGN PROCESS

manager

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managing system

management protocol

managed systems

agent

primary functions

agent

primary functions

agent

primary functions

agent

primary functions

agent

primary functions
MANAGEMENT AS PART OF THE DESIGN PROCESS

User Requirements

- design
- first realization
- better manager

redesign

operational phase

time
MANAGEMENT AS PART OF THE DESIGN PROCESS

User Requirements

- design
- first realization
- better manager
- better realization

design

manager redesign

redesign

complete redesign

operational phase

time

14
MANAGEMENT AS PART OF THE DESIGN PROCESS

distributed

centralized

explicit

implicit

time
MANAGEMENT AS PART OF THE DESIGN PROCESS

All User Requirements

- Basic network layer protocol
- ES-IS routing
- IS-IS intra-domain routing
- IS-IS inter-domain routing
- ES address assignment
- Group address extensions
User Requirements

- primary functions
- elaboration of management functions
- elaboration of meta-management functions
MANAGEMENT AS PART OF THE DESIGN PROCESS

Meta-management functions: SNMPv2

SNMPv2 MIB
Party MIB
Manager to Manager MIB

Management functions: SNMPv2

MIB-II

Primary functions: TCP
A PROTOCOL MANAGEMENT ARCHITECTURE

layer N

P <--- data interactions ---> P
A PROTOCOL MANAGEMENT ARCHITECTURE

layer $N$

P M ← data + management interactions → P M
A PROTOCOL MANAGEMENT ARCHITECTURE

layer N

P M'  P M'  M''
A PROTOCOL MANAGEMENT ARCHITECTURE

Diagram showing interactions between different components labeled M', M'', and P.
A PROTOCOL MANAGEMENT ARCHITECTURE

layer N

underlying service provider
A PROTOCOL MANAGEMENT ARCHITECTURE

Layer N

Service provider for normal user data

Service provider for management information
MULTIPLE MANAGEMENT ARCHITECTURES

• SERVICE MANAGEMENT
• PROTOCOL MANAGEMENT
• ELEMENT MANAGEMENT

SIMILAR IDEAS AS TMN
BETTER FORMALIZED
SERVICE MANAGEMENT ARCHITECTURE

normal (data) SAPs

service provider

addition of service management

normal (data) SAPs

special (service management) SAP to connect service manager

service provider
SERVICE MANAGEMENT ARCHITECTURE

Telecom view of service provider

Normal user
Normal user
Normal user
Normal user
Service manager

functional view of service provider