Remote Management of Wireless Gateway

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- Wireless Technologies and Devices
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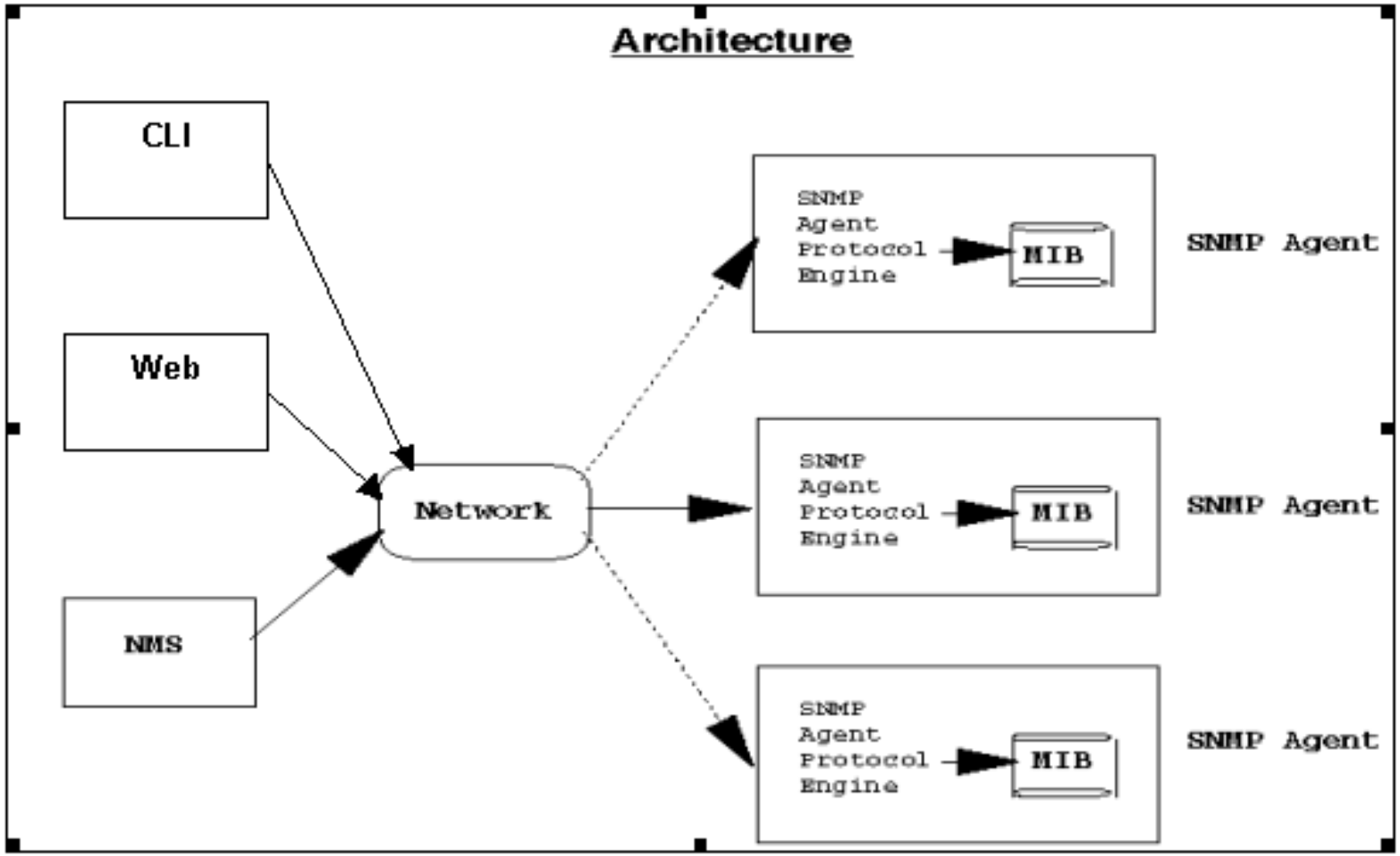
Introduction

- The *Remote Management of Wireless Gateway* is about remotely controlling, configuring, monitoring and managing the network device, a wireless gateway, using external management interfaces like Web, CLI and SNMP Browser interfaces.
- The core protocol this technology built around is SNMP, *Simple Network Management Protocol*.
- *Wireless Communication* is a term used to describe telecommunications in which electromagnetic waves (rather than some form of wire) carry the signal over part or the entire communication path.
- The *Wireless Gateway* is an edge network device, meant for internetworking, a system that joins two networks together.

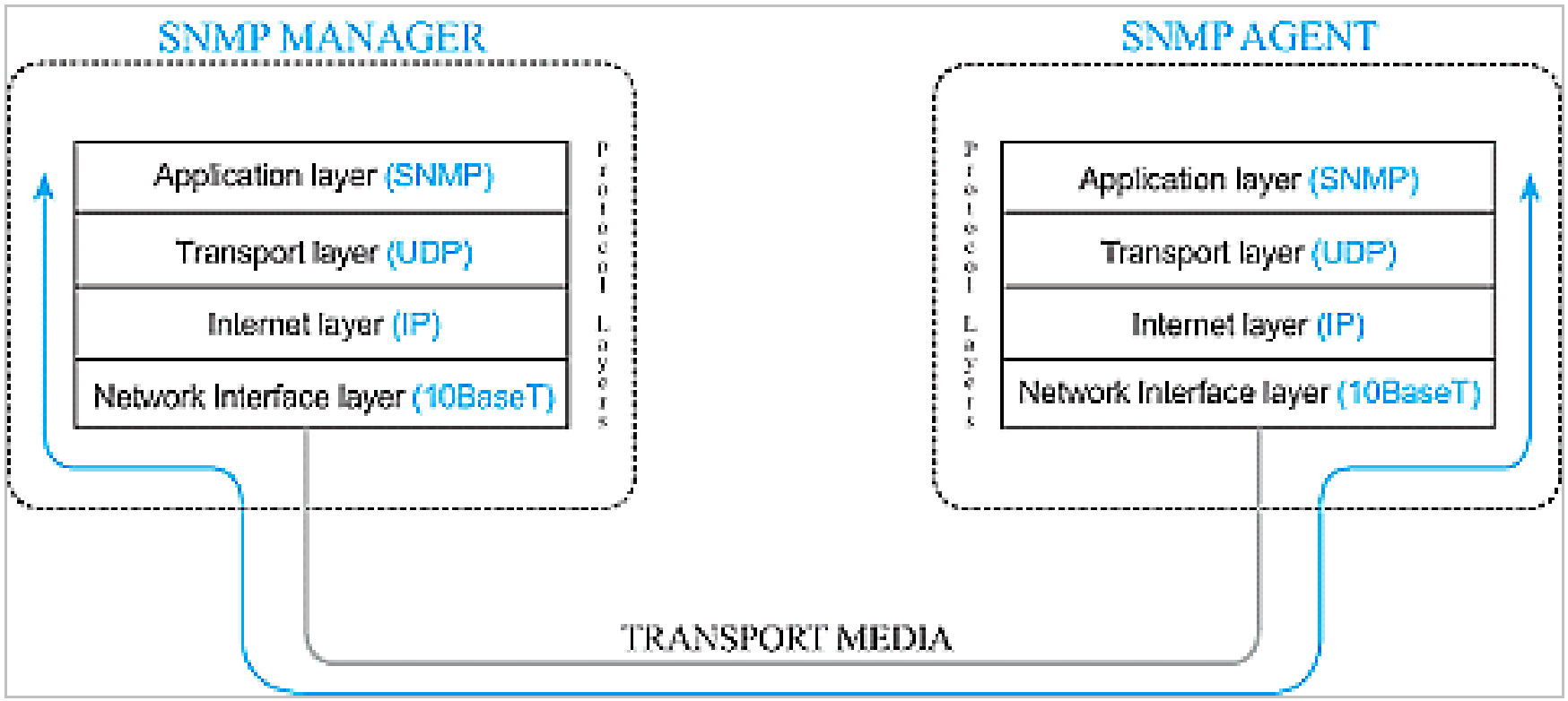
SNMP Protocol

- The *Simple Network Management Protocol (SNMP)* is an application layer protocol that facilitates the exchange of management information between network devices.
- Two **versions of SNMP** exist: SNMP version 1 (SNMPv1) and SNMP version 2 (SNMPv2).
- Managed devices are monitored and controlled using four basic SNMP commands: **read**, **write**, **trap**, and **traversal** operations.
- SNMP lacks any authentication capabilities, which results in *vulnerability to a variety of security threats*.
- A *Management Information Base* (MIB) is a collection of information that is organized hierarchically.
- The MIB/ **SNMP Browser** is an NMS application that could monitor and control managed device.
- **SNMP Agent** is a network-management software module that resides in a managed device, wireless gateway.

SNMP Operation



SNMP Data Path



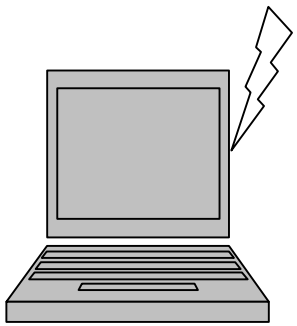
Wireless Technologies and Devices - 1

- Most typical devices/applications are
  - Telephony/Voice and Messaging
    - Cell phones, Pagers, and commercial two-way business radios
    - Analog standard is Advanced Mobile Phone Service (**AMPS**).
    - Digital standards are Global System for Mobile Communications (**GSM**), Time Division Multiple Access (**TDMA**), or Code Division Multiple Access (**CDMA**).
  - Hand-held and other Internet-enabled devices
    - Internet-enabled cell phones and Personal Digital Assistants (PDAs).
    - Wireless Application Protocol (**WAP**), and new languages, such as **WML** (Wireless Markup Language) have been developed specifically for these devices to connect to the Internet.
  - Data Networking
    - Wireless Gateways/ Access Points and Pure data applications use Wireless Local Area Network (**WLANs**) technology.
    - Data, voice, and video converged in Broadband Wireless (**BW**).
    - Bluetooth, an emerging wireless technology.

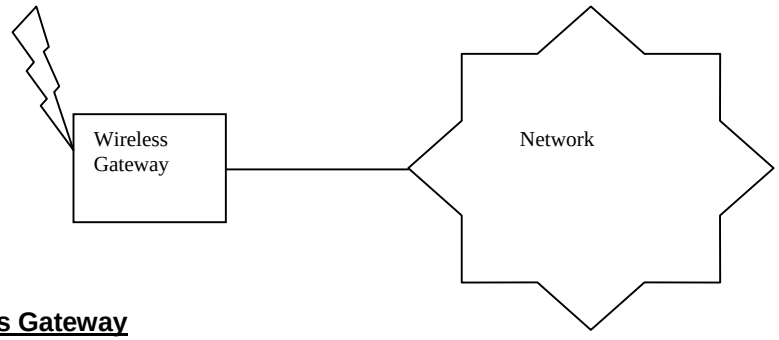
Wireless Technologies and Devices - 2

- **Wireless Local Area Networks** (WLAN) are implemented as an extension to wired LANs within a building and can provide the final few meters of connectivity between a wired network and the mobile user.
- **WLAN**s are based on the IEEE 802.11 standard.
  - 802.11b (2.4 GHz) provides throughput rates up to 11 Mbps.
  - 802.11a (5 GHz) provides throughput rates up to 54 Mbps.
- **Broadband wireless** (BW) is an emerging wireless technology that allows simultaneous wireless delivery of voice, data, and video.
- **Bluetooth** is a technology specification for small form factor, low-cost, short-range wireless links between mobile PCs, mobile phones, and other portable handheld devices, and connectivity to the Internet.

WLAN Network



Subscriber

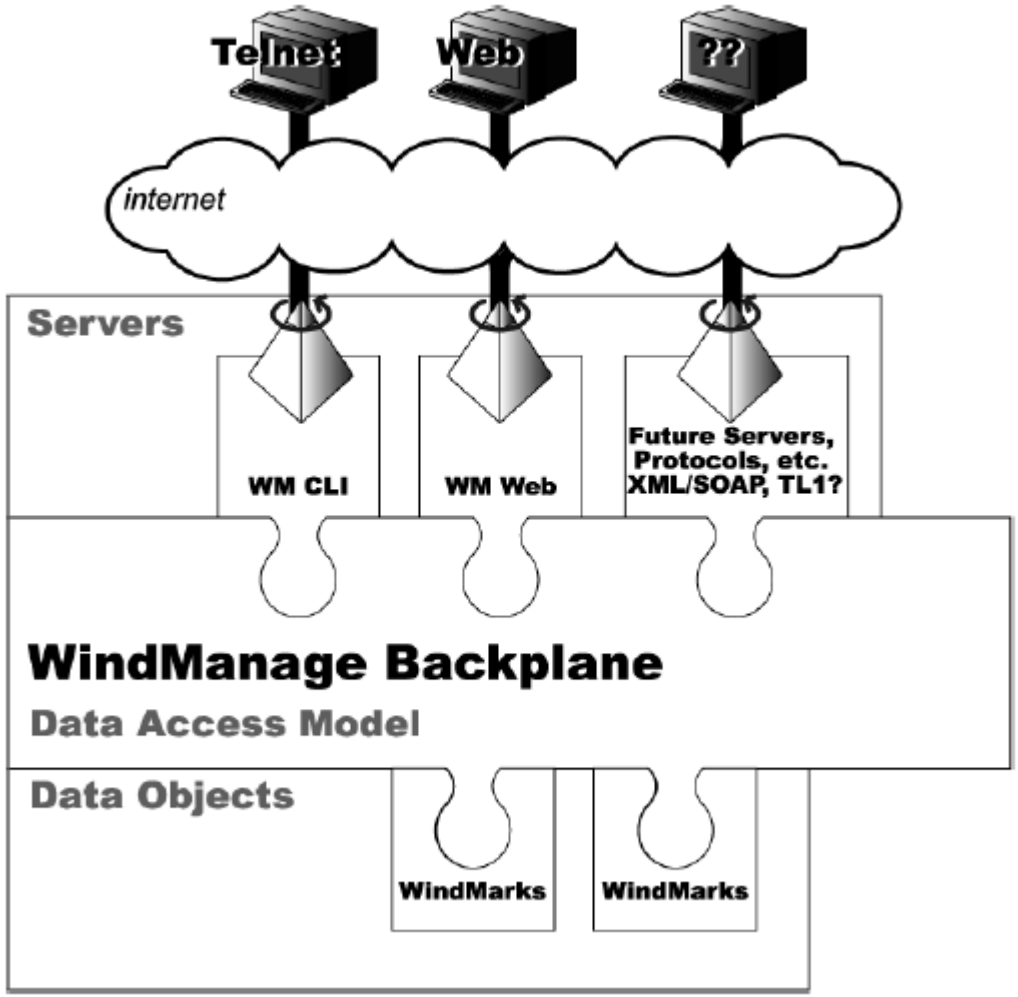


Wireless Gateway

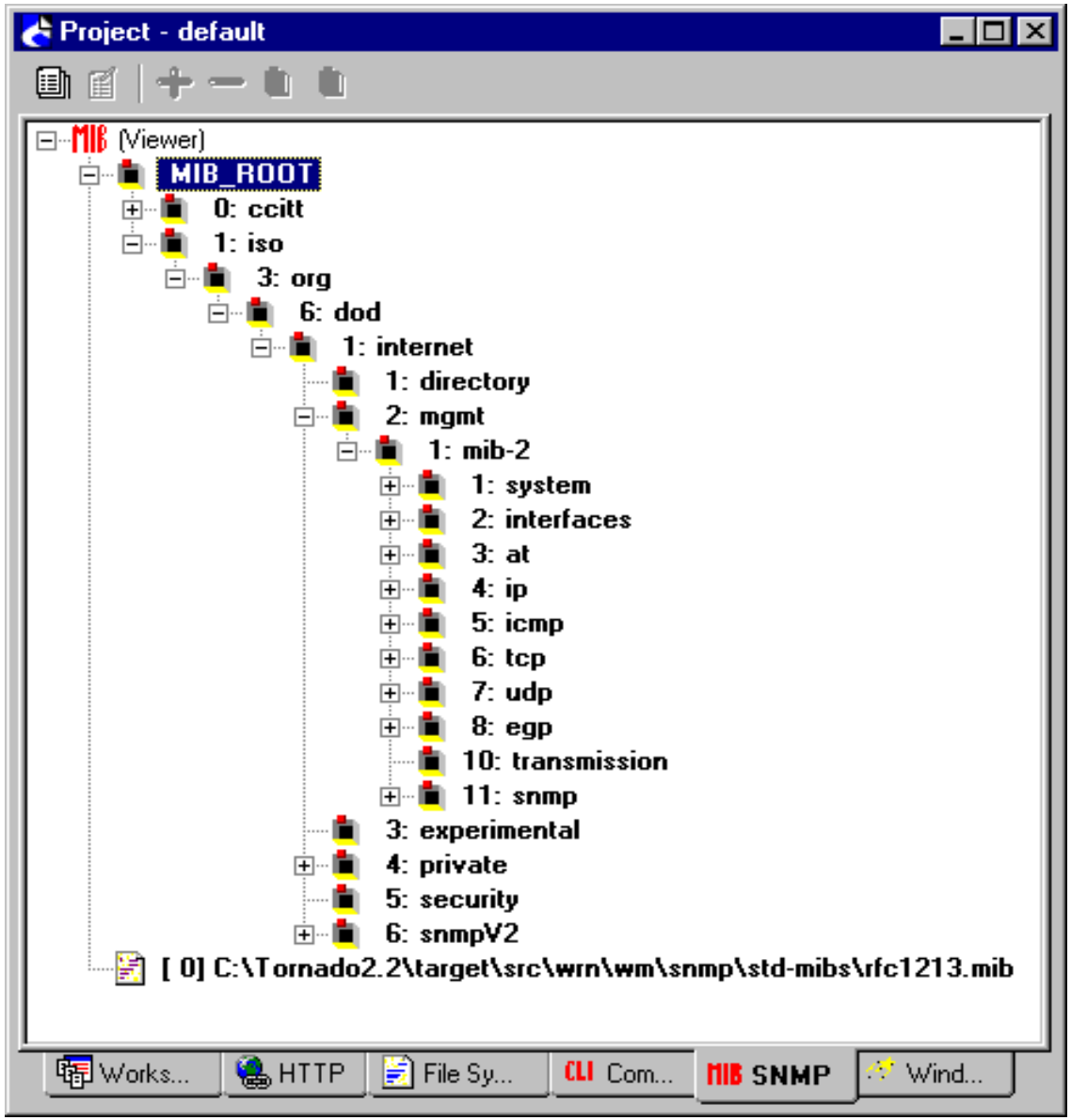
Device Management Interfaces

- **Web Browser,** the HTTP compliant Web browser is an NMS application and one of the most preferred device management interface sought. The Web browser displays device HTML based configuration, management screens to enable user configure, manage the remote managed device.
- **CLI, Command Line Interface**, The **Serial** Interface and **Telnet** are also widely used in industry to run commands to configure and manage the managed device. They provide neatly organized commands to enable the user to issue different commands to the managed devices, to GET or SET a device configuration variable.
- **MIB/SNMP Browser,** is an NMS application that could configure, monitor and control managed device, a Wireless Gateway.

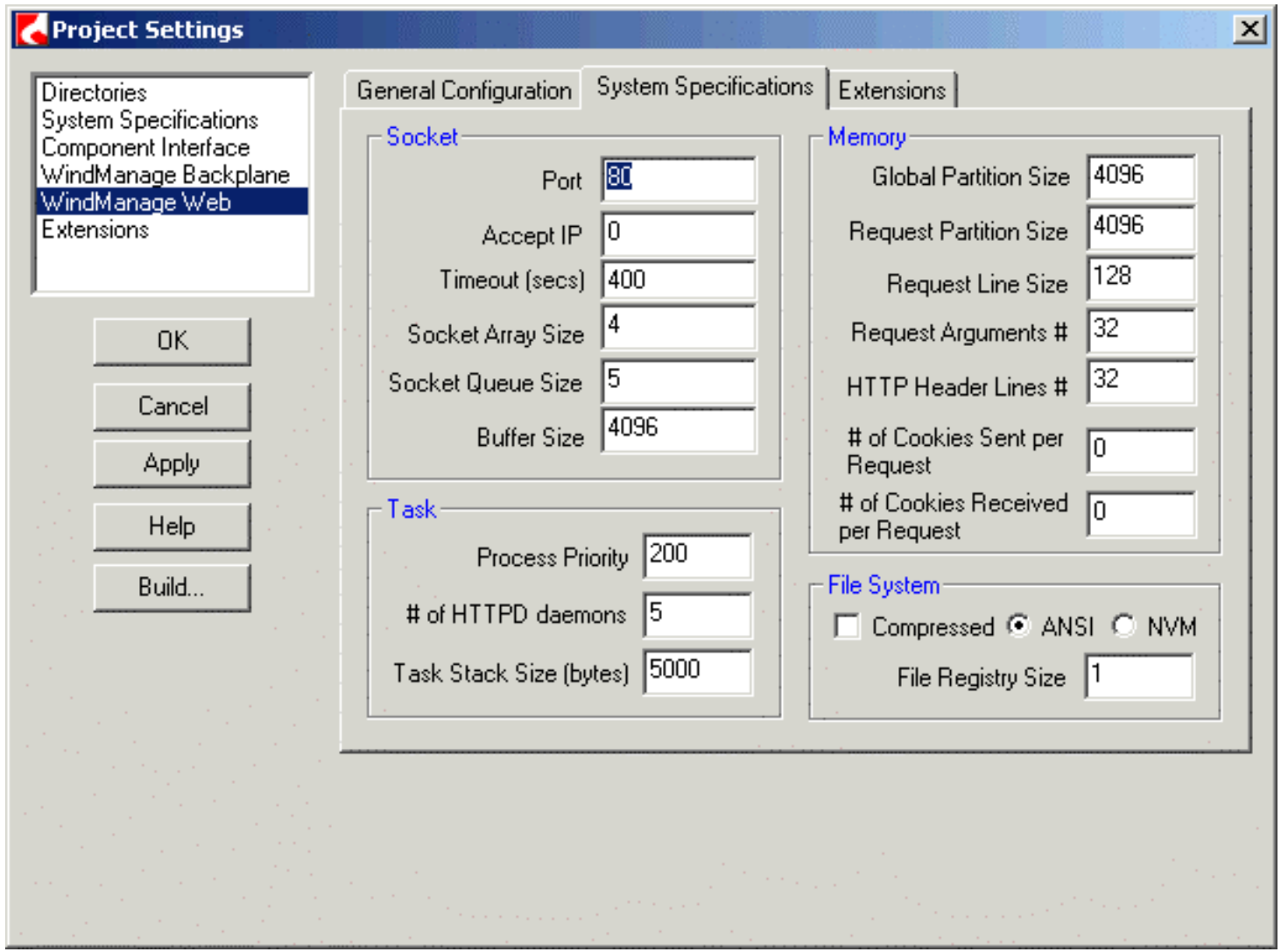
WMIT Architecture - 1



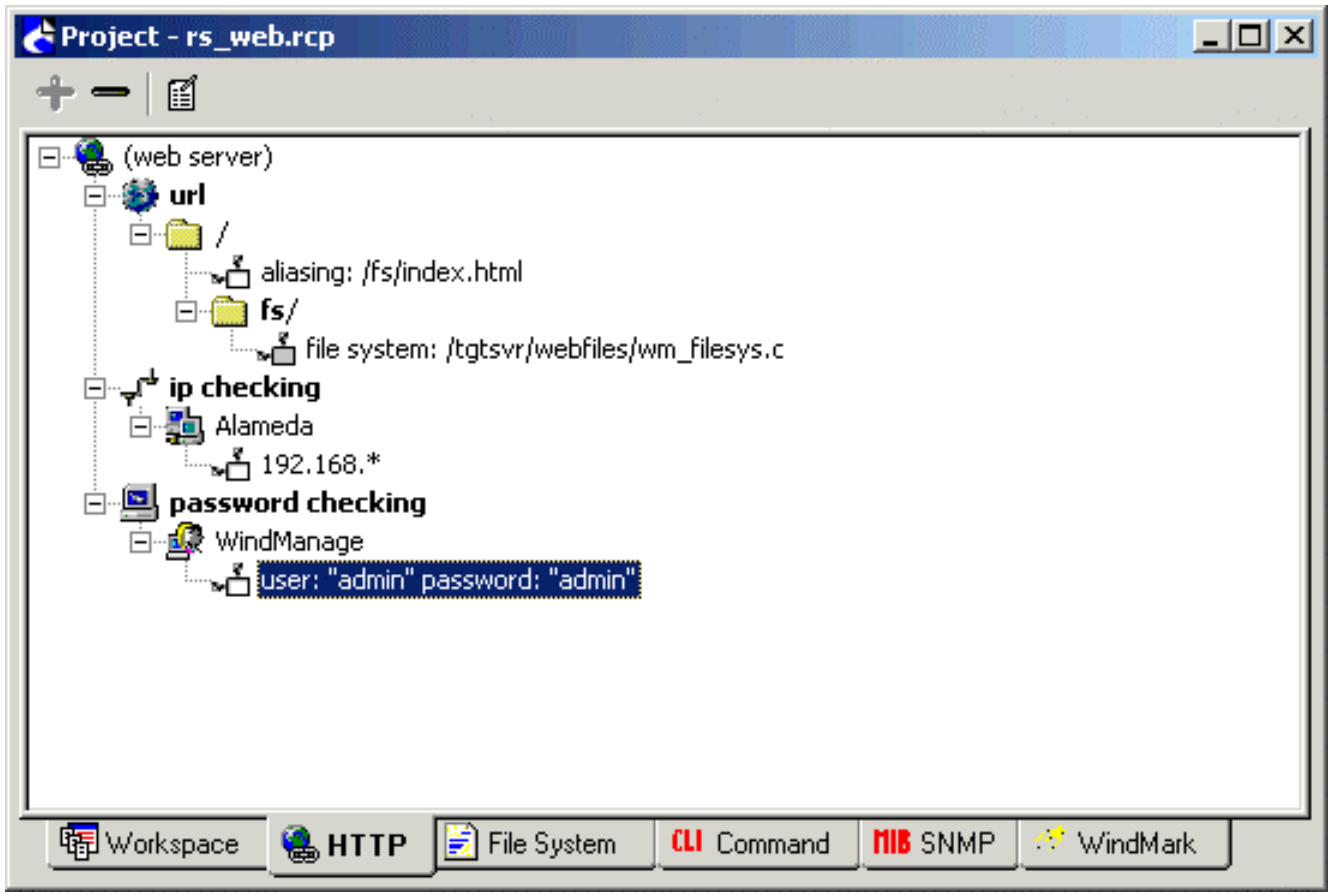
WMIT Architecture - 2



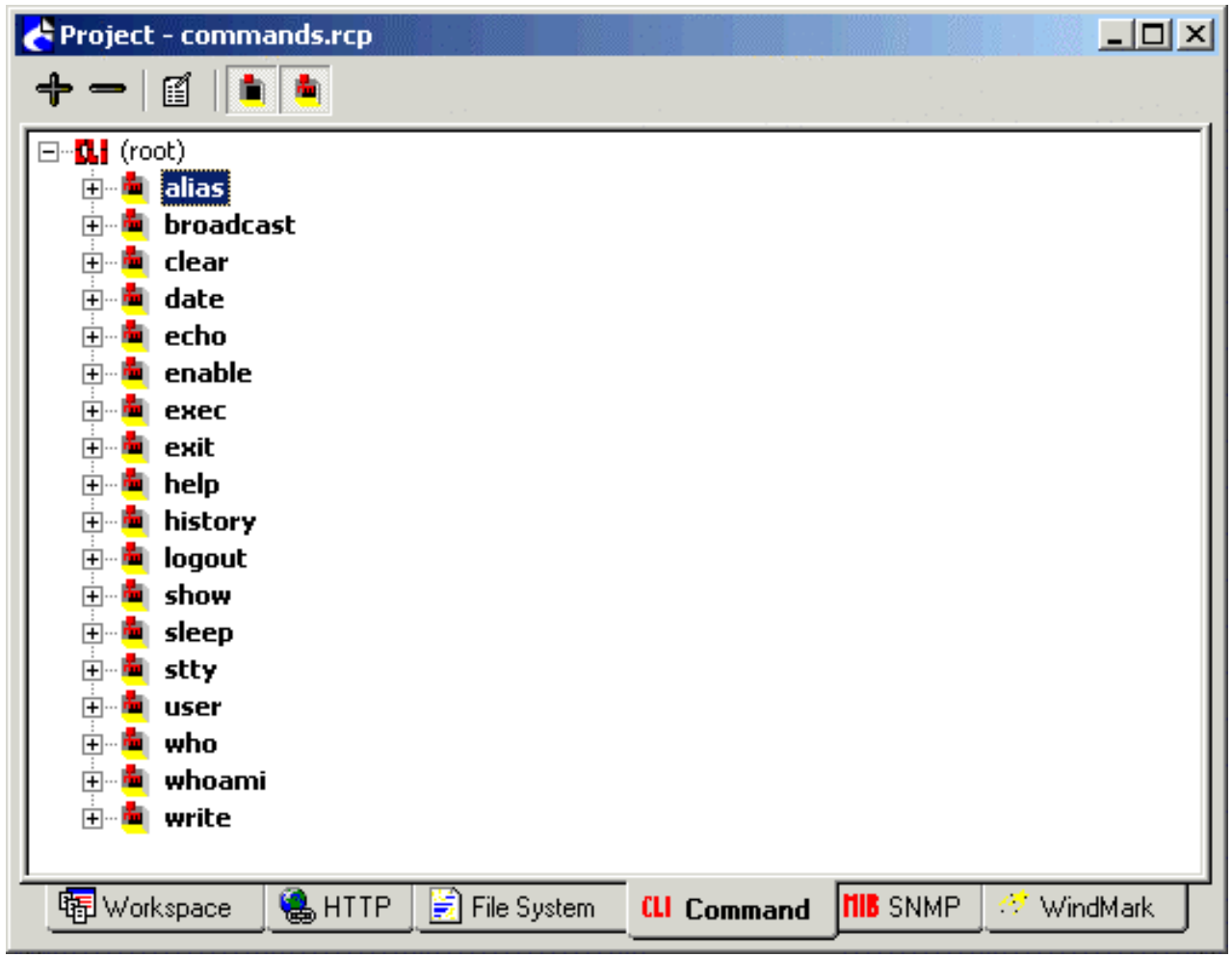
WMIT Architecture - 3



WMIT Architecture - 4



WMIT Architecture - 5



WMIT Architecture - 6

- Integrated device management technology bundles external management interfaces including SNMP, Web server, command line interface (CLI), as well as custom interfaces, with an easy-to-use development framework.
- Unified Access and Security Provides a single set of data objects that normalize data access and security for multiple external management technologies simultaneously.
- Unified Tools - WindManage Integration Tool ties all of the device management products together and makes unified access a reality.
- Extensibility Enables the addition of custom and future management technologies through an open architecture.

WMIT Architecture - 7

WIND MANAGE provides code and tools to support the development of the following:

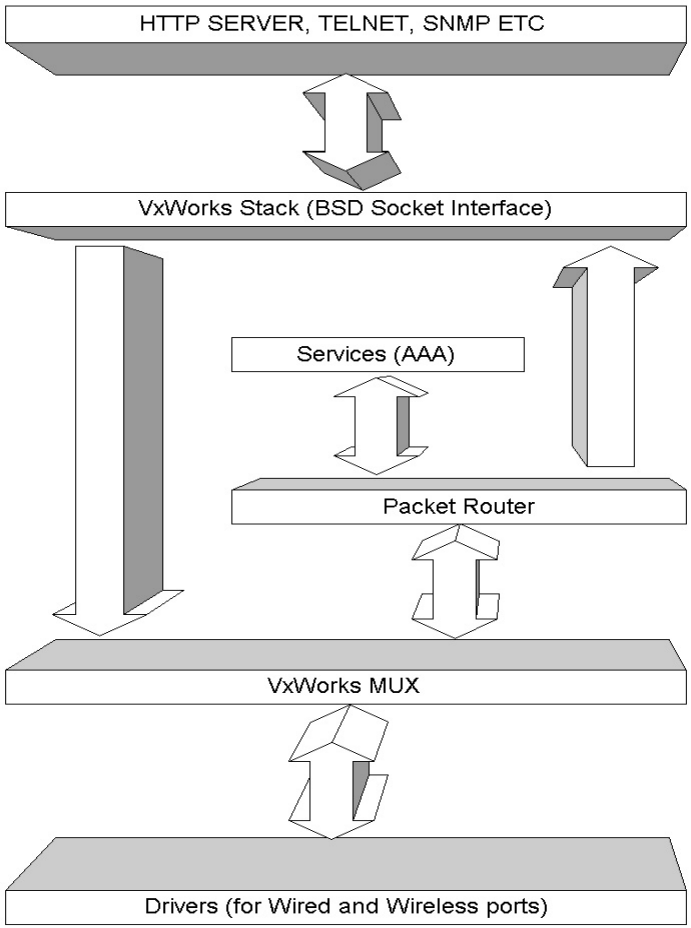
- Command Line Interfaces, using WIND MANAGE CLI.
- Web-based Interfaces, using WIND MANAGE WEB.
- Web or CLI interfaces that can execute SNMP operations on the embedded SNMP agent, using WIND MANAGE MIBway.

WMIT Architecture - 8

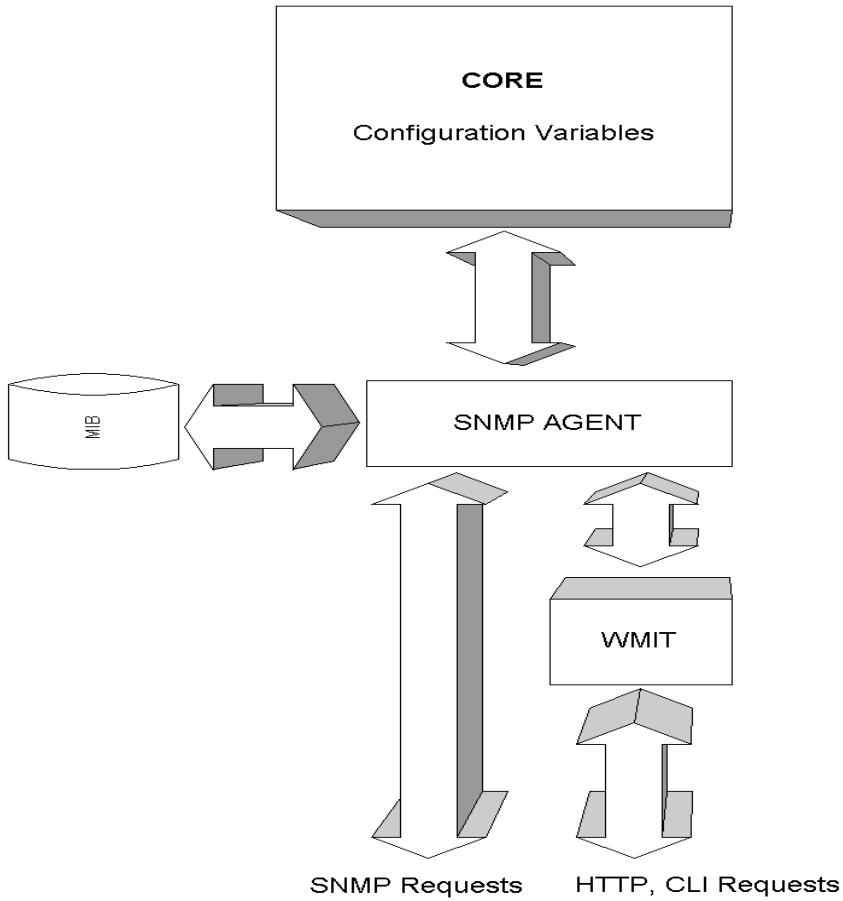
The backplane provides the following services:

- locking
- transaction processing
- data validation
- data conversion
- data object access control
- language localization

Software Design - 1



Software Design - 2



Summary

Remote device management has emerged as a crucial requirement for todays networked devices. The range of products requiring device management is extremely diverse, with different requirements existing within each market segment.

Remote management capabilities could be built into products for virtually any networked device using SNMP and allied technologies.

The efficient remote device management implementation is necessary to enhance the MIB seamlessly in future.

Conclusions and Recommendations

The remote device management is about monitoring, managing and controlling a managed device remotely.

The same technology could be extended to monitor, manage and control multiple managed devices centrally. This new generation remote management software would enable the network administrator to centrally enforce access control rules over multiple managed devices.

Tools and Technology used

- VxWorks
  - **Version 5.5**
- Tornado IDE
  - **Version 2.2.1**
- Wind Manage Integration Tool
  - **Version 4.1**
- WIND MANAGE SNMPv1/v2c
  - **Version 9.4.1**
- SNMPc Network Manager
  - **Version 7.0.5**
- GNU Tool Chain
  - **Version 2.6**
- Windows XP Host Machine

Project Start Date: 1st Dec 2005, End Date: 15th March 2006

Thank You

Q & A