

Remote System Management Principles

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Abstract

This paper introduces the principles of Agilent's remote system management solutions, which have been designed to maintain and administrate servers and communication systems. From the standpoint of remote management tasks the required system architecture will be clarified. Different integration strategies for remote system management solutions will be presented.

1. Introduction

Remote management solutions enable system management from a distant location [1]. Typical applications are administration and maintenance of servers [2] or communication systems [3]. In both cases remote access may be provided via a network, or phone line.

System management includes many comprehensive tasks. Ideally remote management would provide the same flexibility and functionality as local management. This includes system configuration and administration as well as reset, shutdown, and toggle power [2][3]. The driving force behind remote management is saving personnel, which observes the system for 24 hours a day, 7 days a week. Therefore a remote management solution must proactively prevent the system from failure. As a result it has to examine the system's health permanently and raise alerts before deterioration conditions cause the system to fail. If a system is hanging or defective, a remote management solution has to assist the administrator in detecting failures and defective units remotely.

Remote management requires a user interface at the management site. Since the remote connection is typically established via a network, it is obvious to rely on widely used techniques. Agilent's remote management solutions include a Web server at the system side. Therefore the administrator will use a Web browser to access the functions, which are provided by the management solution. The benefit of this approach is that Web browsers are available for many platforms, which makes the user interface interoperable to many platforms. Furthermore mobile communication devices with Web access enable remote control from any location.

Since Web servers respond only upon request, another channel is needed for proactive notifications. Therefore the remote management solution may send emails, SNMP traps, or alerts to a pager.

In the following chapter a typical system architecture for remote management will be presented. Afterwards the integration issues will be discussed.

2. System Architectures for Remote Management

This chapter will deal with architectural aspects, which are important for a server or communication system to support remote management. The architecture must provide an interface to access system conditions and to perform control tasks. The required functionality is usually provided by a management subsystem. In the meantime a highly accepted standard has arisen, which is based on the Intelligent Platform Management Interface (IPMI, [4]). To enable additional access to essential system components, the remote management solution should be integrated into the system bus (e.g. PCI).

Basically the IPMI subsystem (see figure 1) consists of a set of sensors, a non-volatile memory storing the system event log (SEL), and a baseboard management controller (BMC). All components are interconnected in using the standard I²C bus [5]. On this bus IPMI defines a dedicated communication layer. The complete IPMI subsystem is controlled by the BMC. It administrates the SEL and accesses the system sensors. The sensors typically measure system conditions like temperature, voltage, fan speed, but also things like the presence of hot swap drives. Besides the IPMI interface the BMC has a system interface, which enables communication with the main system by using the BIOS. For remote management the BMC is the key device. Either the remote management solution will communicate with the BMC as shown in figure 1, or it will be integrated with the BMC as a single device.

Another source for gathering system information is the system bus. It enables component tests (e.g. memory) as well as the analysis of the system bus to get information on performance and utilization. Other tasks, which may be performed via the system bus are console redirection, VGA screenshots, or capturing the last screen before

Legend:

- IPMI Intelligent Platform Management Interface
- BMC Baseboard Management Controller
- SEL System Event Log
- IF Interface
- RM Remote Management

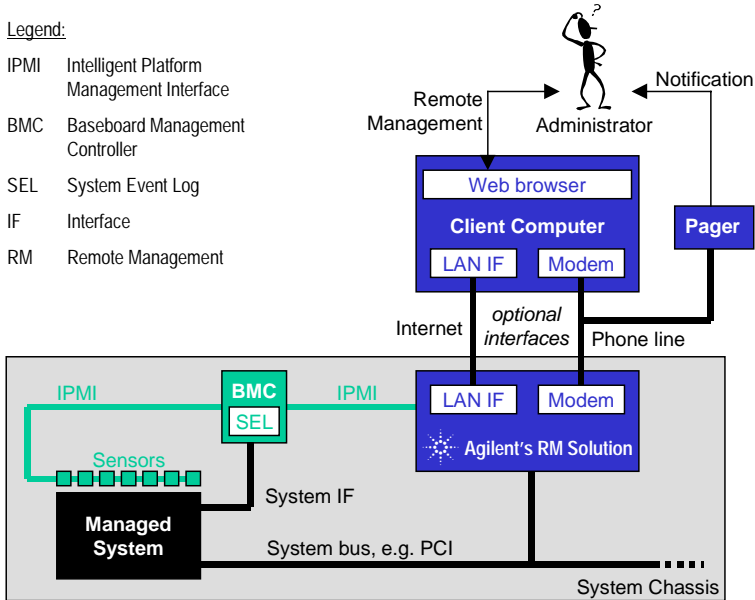


Figure 1: Overview on a system architecture for remote management.

automatic system reboot. Furthermore a remote floppy may be attached and a remote boot disk may be provided.

Remote access may be performed by using a LAN interface or a modem. While Web based access can be performed via both interfaces, notification tasks are assigned to the appropriate channel, i.e. paging may only be performed via a phone line, or SNMP traps may only be sent using the LAN interface.

A further aspect in remote management is the power source of the management device. It must be independent from the power of the managed system in order to toggle the power switch. While this may be achieved with a separate AC/DC adapter, management during power outage is only possible with a battery. A comprehensive solution relies on both a separate power supply and a backup battery.

3. Remote System Management Solutions

This chapter focuses on current remote management solutions, which may be integrated into servers or communication systems. Full integration of Agilent's remote management products into existing servers or communication systems requires a PCI bus and an IPMI interface. If one of these connectors is not available, the remote management solution will still function but with less features. Today's portfolio [1] includes embedded Remote Management Chips (eRMC, [2]), Remote Management Cards (RMC, [2]), and PCI Mezzanine Remote Management Cards (pRMC, [3]).

The eRMC chip solution is targeted to be integrated into future products. Depending on the design efforts, this solution targets high volume or highly integrated servers or communication systems. Other applications of the

eRMC are custom developments including new features, which are not available with other remote management products.

The remote management cards are designed for PCI (RMC) or compactPCI (pRMC) systems. As final products these cards are ready to run in present servers and communication systems. As previously described such systems must provide an IPMI interface to be completely manageable from a remote location.

While the eRMC chip solution is more cost effective, especially for high volume products, the RMC/pRMC card solutions offer a certain flexibility. The card could be offered as an optional accessory or bundled with the system. Existing systems may be upgraded only when remote management features are needed. Furthermore the card solutions require much less integration efforts.

4. Summary

The distribution of communication systems of all kinds is expanding and communication infrastructures are becoming denser. This also results in an increasing demand for remote management solutions. Intelligent management concepts are especially in demand for mission critical applications. Agilent Technologies serves this demand with a variety of remote management solutions. IPMI enables comprehensive management tasks as standard whilst maintaining interoperability and flexibility. Therefore prospective development of future servers and communication systems will integrate the necessary infrastructure to support remote management.

5. References

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