



Part of the five-volume
Networking Services Developer's Reference Library
微软网络编程与开发丛书

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深入网络编程与开发
IT 企业和网络编程人员必备

The essential reference set for developing with
Microsoft® Windows® networking technologies

David Iseminger
Series Editor
www.iseminger.com

Networking Services

[美] Microsoft 公司 著

Remote Access Services 远程访问服务

(影印版)

北京大学出版社
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微软网络编程与开发影印丛书

Remote Access Services

远程访问服务

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内 容 简 介

本书是 NETWORKING SERVICES DEVELOPER'S REFERENCE LIBRARY (微软网络编程与开发影印丛书) 中的一本。主要内容包括程序设计指南和远程访问。讲述了远程访问服务 (RAS), 以及 Microsoft Windows NT Server 4.0 和 Microsoft Windows 2000 Server 所支持的路由与远程访问服务 (RRAS) 中内嵌的远程访问服务功能。有了 RAS API 以及 RRAS API 中内嵌的远程访问组件, 您就可以创建应用程序来把远程客户计算机连接到局域网, 还可以实现虚拟专用网 (VPN), 这样远程计算机在网络上运行时就象在本地接入一样。

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电 子 信 箱: wdzh@mail.263.net.cn

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前 言

在我们的生活和工作越来越离不开网络的今天，网络的速度、性能以及如何充分利用现有网络的容量都是至关重要的问题。Windows 2000 的几乎每一个新特性和新组件都必须直接或间接地使用网络。为了帮助用户最大限度地利用 Windows 2000 的网络特性，我们组织影印了这套 5 卷本的丛书，《微软网络编程与开发影印丛书》。本丛书可为编程人员提供完整的、考虑周全的参考资料。本丛书将最广泛使用的、最重要的和最及时的 Windows 网络技术信息搜集整理成册，便于开发人员开发更好的、与网络紧密集成的、在 Windows 平台上运行的应用程序。

本丛书的每一卷都侧重于 Windows 网络技术的不同领域，并结合 Windows 程序员的实际需要，精心编排了完整的索引，便于阅读和查找信息。本丛书的精心设计还有助于程序员方便地找到 Microsoft 的其他参考资料，包括印刷资料和电子版资料。每一本书还包括一个对整套丛书的概述，一个关于编程要素的附录，以及关于所引用的 Microsoft 技术的索引。但本丛书的内容远不止这些。本丛书是关于 Windows 网络特性、协议和服务的最佳资源。

本丛书的主编 David Iseminger 是 Microsoft 的独立顾问，作为网络和路由器性能分析师、通信专家和性能工具开发者，自 Windows NT 3.5 以来，他就一直从事 Windows NT 和 Windows 2000 的研究与开发工作。最近，他作为程序员，正在与开发人员文档组(Developer Documentation Group)一道，创建和维护 MSDN 建立的和新兴的网络技术，包括服务质量(Quality of Service)。作为计算机图书作家，David 的著作颇丰，包括他最新创作、Microsoft 出版的《Active Directory Services for Microsoft Windows 2000 Technical Reference》。David 毕业于华盛顿大学，现居住在华盛顿州的 Puget Sound 城。欲详细了解 David 的工作以及本丛书的其他作品，请访问站点：www.iseminger.com。

本丛书由以下 5 本书组成：

- 《Windows Sockets and QOS》(《Winsock 和 QOS》)
- 《Network Protocols and Interface》(《网络协议和接口》)
- 《RPC and Windows Networking》(《RPC 和 Windows 网络》)
- 《Remote Access Services》(《远程访问服务》)
- 《Routing》(《路由》)

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CHAPTER 1

Getting Around in the Networking Services Library

Networking is pervasive in this digital age in which we live. Information at your fingertips, distributed computing, name resolution, and indeed the entire Internet—the advent of which will be ascribed to our generation for centuries to come—imply and require networking. Everything that has become the buzz of our business and personal lives, including e-mail, cell phones, and Web surfing, is enabled by the fact that networking has been brought to the masses (and we’ve barely scraped the beginning of the trend). You, the network-enabled Windows application developer, need to know how to lasso this all-important networking services capability and make it a part of your application. You’ve come to the right place.

Networking isn’t magic, but it can seem that way to those who aren’t accustomed to it (or to the programmer who isn’t familiar with the technologies or doesn’t know how to make networking part of his or her application). That’s why the *Networking Services Developer’s Reference Library* isn’t just a collection of programmatic reference information; it would be only half-complete if it were. Instead, the Networking Services Library is a collection of explanatory and reference information that combine to provide you with the complete set that you need to create today’s network-enabled Windows application.

The Networking Services Library is *the* comprehensive reference guide to network-enabled application development. This library, like all libraries in the Windows Programming Reference Series (WPRS), is designed to deliver the most complete, authoritative, and accessible reference information available on a given subject of Windows network programming—without sacrificing focus. Each book in each library is dedicated to a logical group of technologies or development concerns; this approach has been taken specifically to enable you to find the information you need quickly, efficiently, and intuitively.

In addition to its networking services development information, the Networking Services Library contains tips designed to make your programming life easier. For example, a thorough explanation and detailed tour of MSDN Online is included, as is a section that helps you get the most out of your MSDN subscription. Just in case you don’t have an MSDN subscription, or don’t know why you should, I’ve included information about that too, including the differences between the three levels of MSDN subscription, what each level offers, and why you’d want a subscription when MSDN Online is available over the Internet.

To ensure that you don't get lost in all the information provided in the Networking Services Library, each volume's appendixes provide an all-encompassing programming directory to help you easily find the particular programming element you're looking for. This directory suite, which covers all the functions, structures, enumerations, and other programming elements found in network-enabled application development, gets you quickly to the volume and page you need, saving you hours of time and bucketsful of frustration.

How the Networking Services Library Is Structured

The Networking Services Library consists of five volumes, each of which focuses on a particular aspect of network programming. These programming reference volumes have been divided into the following:

- Volume 1: Winsock and QOS
- Volume 2: Network Interfaces and Protocols
- Volume 3: RPC and WNet
- Volume 4: Remote Access Services
- Volume 5: Routing

Dividing the Networking Services Library into these categories enables you to quickly identify the Networking Services volume you need, based on your task, and facilitates your maintenance of focus for that task. This approach enables you to keep one reference book open and handy, or tucked under your arm while researching that aspect of Windows programming on sandy beaches, without risking back problems (from toting around all 3,000+ pages of the Networking Services Library) and without having to shuffle among multiple less-focused books.

Within the Networking Services Library—and in fact, in all WPRS Libraries—each volume has a deliberate structure. This per-volume structure has been created to further focus the reference material in a developer-friendly manner, to maintain consistency within each volume and each Library throughout the series, and to enable you to easily gather the information you need. To that end, each volume in the Networking Services Library contains the following parts:

- Part 1: Introduction and Overview
- Part 2: Guides, Examples, and Programmatic Reference
- Part 3: Intelligently Structured Indexes

Part 1 provides an introduction to the Networking Services Library and to the WPRS (what you're reading now), and a handful of chapters designed to help you get the most out of networking technologies, MSDN, and MSDN Online. MSDN and WPRS Libraries are your tools in the developer process; knowing how to use them to their fullest will enable you to be more efficient and effective (both of which are generally desirable traits). In certain volumes (where appropriate), I've also provided additional information that you'll need in your network-enabled development efforts, and included such information as concluding chapters in Part 1. For example, Volume 3 includes a chapter that explains terms used throughout the RPC development documentation; by putting it into Chapter 5 of that volume, you always know where to go when you have a question about an RPC term. Some of the other volumes in the Networking Services Library conclude their Part 1 with chapters that include information crucial to their volume's contents, but I've been very selective about including such information. Publishing constraints have limited the amount of information I can provide in each volume (and in the library as a whole), so I've focused on the priority: getting you the most useful information possible within the number of pages I have to work with.

Part 2 contains the networking reference material particular to its volume. You'll notice that each volume contains *much* more than simple collections of function and structure definitions. A comprehensive reference resource should include information about how to use a particular technology, as well as definitions of programming elements. Consequently, the information in Part 2 combines complete programming element definitions with instructional and explanatory material for each programming area.

Part 3 is a collection of intelligently arranged and created indexes. One of the biggest challenges of the IT professional is finding information in the sea of available resources and network programming is probably one of the most complex and involved of any development discipline. In order to help you get a handle on network programming references (and Microsoft technologies in general), Part 3 puts all such information into an understandable, manageable directory (in the form of indexes) that enables you to quickly find the information you need.

How the Networking Services Library Is Designed

The Networking Services Library (and all libraries in the WPRS) is designed to deliver the most pertinent information in the most accessible way possible. The Networking Services Library is also designed to integrate seamlessly with MSDN and MSDN Online by providing a look and feel consistent with their electronic means of disseminating Microsoft reference information. In other words, the way a given function reference appears on the pages of this book has been designed specifically to emulate the way that MSDN and MSDN Online present their function reference pages.

The reason for maintaining such integration is simple: to make it easy for you to use the tools and get the ongoing information you need to create quality programs. Providing a "common interface" among reference resources allows your familiarity with the Networking Services Library reference material to be immediately applied to MSDN or MSDN Online, and vice-versa. In a word, it means *consistency*.

You'll find this philosophy of consistency and simplicity applied throughout WPRS publications. I've designed the series to go hand-in-hand with MSDN and MSDN Online resources. Such consistency lets you leverage your familiarity with electronic reference material, then apply that familiarity to enable you to get away from your computer if you'd like, take a book with you, and—in the absence of keyboards and e-mail and upright chairs—get your programming reading and research done. Of course, each of the Networking Services Library volumes fits nicely right next to your mouse pad as well, even when opened to a particular reference page.

With any job, the simpler and more consistent your tools are, the more time you can spend doing work rather than figuring out how to use your tools. The structure and design of the Networking Services Library provide you with a comprehensive, presharpened toolset to build compelling Windows applications.

CHAPTER 2

What's In This Volume?

Volume 4 of the *Networking Services Developer's Reference Library* gives its undivided attention to Remote Access Services, commonly referred to simply as RAS.

The Remote Access Service (RAS) API is included in Microsoft Windows NT 4.0. RAS is used to create client applications that can display any of the Routing and RAS common dialog boxes, start and end a remote access connection, manipulate phone-book entries and network addresses that are mapped to phone-book entries, and get information about existing RAS connection status or RAS-capable devices.

RAS makes it possible to connect a remote client computer to a network server over a Wide Area Network (WAN) link or a Virtual Private Network (VPN). The remote computer can then participate on the server's LAN as though the remote computer was connected to the LAN directly. The RAS API enables programmers to access the features of RAS programmatically. The API is applicable in any networking environment that utilizes RAS. Part 2 of this volume provides a complete treatment of RAS.

This volume also has information about how you can use development resources such as MSDN, MSDN Online, and developer support resources. This helpful information is found in various chapters in Part 1, and those chapters are common to all WPRS volumes. By including this information in each library and in each volume, a few goals of the WPRS are achieved:

- I don't presume you have bought, or expect you to have to buy another WPRS Library to get access to this information. Maybe your primary focus is network programming, and your budget doesn't allow for you to purchase the *Active Directory Developer's Reference Library*. Since I've included this information in this library, you don't have to.
- You can access this important and useful information regardless of which volume you have in your hand. You don't have to (nor *should* you have to) fumble with another physical book to refer to information about how to get the most out of MSDN, or where to get support for questions you have about a particular Windows development problem you're having.
- Each volume becomes more useful, more portable, and more complete in and of itself. This goal of the WPRS makes it easier for you to grab one of its libraries' volumes and take it with you, rather than feeling like you must bring multiple volumes with you to have access to the library's important overview and usability information.

These goals have steered this library's content and choices of included technologies; I hope you find its information is useful, portable, a good value, and as accessible as it can be.

Part 2 of this volume provides RAS information in the following chapter-based focuses:

RAS Programming Guide

This guide takes you through the steps necessary to implement RAS capabilities in your Windows application. All such tasks are grouped in task-oriented categories, such as connection operations, AutoDial, server administration, and more.

RAS Reference

A collection of chapters appears after the RAS programming guide that provide a complete treatment of the RAS API.

RRAS Overview

This chapter provides an overview of the new Remote Access capabilities built into RRAS, which is the successor of RAS.

RAS Administration

This chapter provides information and programmatic reference for performing RAS Administration programming using RRAS-based RAS administration. Where there are differences in the treatment of RAS on Windows NT 4.0 and Windows 2000, such differences are clearly noted in the text.

EAP

Windows 2000 supports the Extensible Authentication Protocol (EAP). EAP allows third-party authentication modules to interact with the implementation of the Point-to-Point Protocol (PPP) included in Windows 2000 Remote Access Service (RAS).

EAP is an extension to PPP, providing a standard support mechanism for authentication schemes such as token cards, Kerberos, Public Key, and S/Key. EAP has been made available in response to increasing demand to augment RAS authentication with third-party security devices.

EAP is fully supported on both the Windows 2000 Dial-Up Server and the Dial-Up Networking Client. EAP is a critical technology component for secure Virtual Private Networks (VPN), protecting them against “brute force” or “dictionary” attacks and password guessing.

EAP improves on previous authentication protocols such as Password Authentication Protocol (PAP) and Challenge Handshake Authentication Protocol (CHAP). Windows 2000 supports these earlier authentication protocols as well.

Tracing

The final chapter in this volume describes the implementation of the common tracing DLL, which provides a uniform mechanism for generating diagnostic output for the Windows NT/Windows 2000 Routing and RAS components (as well as any other application that wishes to use the DLL). The DLL provides dynamic configuration change, allowing a user to direct output to a console or to a specified file.

Using Microsoft Reference Resources

Keeping current with all the latest information on the latest networking technology is like trying to count the packets going through routers at the MAE-WEST Internet service exchange by watching their blinking activity lights: It's impossible. Often times, application developers feel like those routers might feel at a given day's peak activity; too much information is passing through them, none of which is being absorbed or passed along fast enough for their boss' liking.

For developers, sifting through all the *available* information to get to the *required* information is often a major undertaking, and can impose a significant amount of overhead upon a given project. What's needed is either a collection of information that has been sifted for you, shaking out the information you need the most and putting that pertinent information into a format that's useful and efficient, or direction on how to sift the information yourself. The *Networking Services Developer's Reference Library* does the former, and this chapter and the next provide you with the latter.

This veritable white noise of information hasn't always been a problem for network programmers. Not long ago, getting the information you needed was a challenge because there wasn't enough of it; you had to find out where such information might be located and then actually get access to that location, because it wasn't at your fingertips or on some globally available backbone, and such searching took time. In short, the availability of information was limited.

Today, the volume of information that surrounds us sometimes numbs us; we're overloaded with too much information, and if we don't take measures to filter out what we don't need to meet our goals, soon we become inundated and unable to discern what's "white noise" and what's information that we need to stay on top of our respective fields. In short, the overload of available information makes it more difficult for us to find what we *really* need, and wading through the deluge slows us down.

This fact applies equally to Microsoft's reference material, because there is so much information that finding what *you* need can be as challenging as figuring out what to do with it once you have it. Developers need a way to cut through what isn't pertinent to them and to get what they're looking for. One way to ensure you can get to the information you need is to understand the tools you use; carpenters know how to use nail-guns, and it makes them more efficient. Bankers know how to use ten-keys, and it makes them more adept. If you're a developer of Windows applications, two tools you should know are MSDN and MSDN Online. The third tool for developers—reference books from the WPRS—can help you get the most out of the first two.

Books in the WPRS, such as those found in the *Networking Services Developer's Reference Library*, provide reference material that focuses on a given area of Windows programming. MSDN and MSDN Online, in comparison, contain all of the reference material that all Microsoft programming technologies have amassed over the past few years, and create one large repository of information. Regardless of how well such information is organized, there's a lot of it, and if you don't know your way around, finding what you need (even though it's in there, somewhere) can be frustrating, time-consuming, and just an overall bad experience.

This chapter will give you the insight and tips you need to navigate MSDN and MSDN Online and enable you to use each of them to the fullest of their capabilities. Also, other Microsoft reference resources are investigated, and by the end of the chapter, you'll know where to go for the Microsoft reference information you need (and how to quickly and efficiently get there).

The Microsoft Developer Network

MSDN stands for Microsoft Developer Network, and its intent is to provide developers with a network of information to enable the development of Windows applications. Many people have either worked with MSDN or have heard of it, and quite a few have one of the three available subscription levels to MSDN, but there are many, many more who don't have subscriptions and could use some concise direction on what MSDN can do for a developer or development group. If you fall into any of these categories, this section is for you.

There is some clarification to be done with MSDN and its offerings; if you've heard of MSDN, or have had experience with MSDN Online, you may have asked yourself one of these questions during the process of getting up to speed with either resource:

- Why do I need a subscription to MSDN if resources such as MSDN Online are accessible for free over the Internet?
- What is the difference between the three levels of MSDN subscriptions?
- Is there a difference between MSDN and MSDN Online, other than the fact that one is on the Internet and the other is on a CD? Do their features overlap, separate, coincide, or what?

If you have asked any of these questions, then lurking somewhere in the back of your thoughts has probably been a sneaking suspicion that maybe you aren't getting the most out of MSDN. Maybe you're wondering whether you're paying too much for too little, or not enough to get the resources you need. Regardless, you want to be in the know and not in the dark. By the end of this chapter, you'll know the answers to all these questions and more, along with some effective tips and hints on how to make the most effective use of MSDN and MSDN Online.