PROTOCOL STANDARD FOR A NetBIOS SERVICE ON A TCP/UDP TRANSPORT: CONCEPTS AND METHODS

ABSTRACT

This RFC defines a proposed standard protocol to support NetBIOS services in a TCP/IP environment. Both local network and internet operation are supported. Various node types are defined to accommodate local and internet topologies and to allow operation with or without the use of IP broadcast.

This RFC describes the NetBIOS-over-TCP protocols in a general manner, emphasizing the underlying ideas and techniques. Detailed specifications are found in a companion RFC, "Protocol Standard For a NetBIOS Service on a TCP/UDP Transport: Detailed Specifications".

NetBIOS Working Group

[Page 1]

DOCKET A L A R M Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

| 1. | STATUS OF THIS MEMO | 6 |
|--|--|----|
| 2. | ACKNOWLEDGEMENTS | 6 |
| 3. | INTRODUCTION | 7 |
| 4. | DESIGN PRINCIPLES | 7 |
| 5. | OVERVIEW OF NetBIOS | 10 |
| 6. | NetBIOS FACILITIES SUPPORTED BY THIS STANDARD | 15 |
| 7. | REQUIRED SUPPORTING SERVICE INTERFACES AND DEFINITIONS | 15 |
| 8. | RELATED PROTOCOLS AND SERVICES | 16 |
| 9. | NetBIOS SCOPE | 16 |
| 10. | NetBIOS END-NODES | 16 |
| 11. | NetBIOS SUPPORT SERVERS | 18 |
| 12. | TOPOLOGIES | 20 |
| 13. | GENERAL METHODS | 23 |
| 14. | REPRESENTATION OF NETBIOS NAMES | 25 |
| 15. | NetBIOS NAME SERVICE | 27 |
| 16. | NetBIOS SESSION SERVICE | 48 |
| 17. | NETBIOS DATAGRAM SERVICE | 55 |
| 18. | NODE CONFIGURATION PARAMETERS | 58 |
| 19. | MINIMAL CONFORMANCE | 59 |
| REFERENCES | | 60 |
| APPI | ENDIX A - INTEGRATION WITH INTERNET GROUP MULTICASTING | 61 |
| APPENDIX B - IMPLEMENTATION CONSIDERATIONS | | 62 |

Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

| 1. STATUS OF THIS MEMO | б |
|--|--|
| 2. ACKNOWLEDGEMENTS | б |
| 3. INTRODUCTION | 7 |
| 4. DESIGN PRINCIPLES 4.1 PRESERVE NetBIOS SERVICES 4.2 USE EXISTING STANDARDS 4.3 MINIMIZE OPTIONS 4.4 TOLERATE ERRORS AND DISRUPTIONS 4.5 DO NOT REQUIRE CENTRAL MANAGEMENT 4.6 ALLOW INTERNET OPERATION 4.7 MINIMIZE BROADCAST ACTIVITY 4.8 PERMIT IMPLEMENTATION ON EXISTING SYSTEMS 4.9 REQUIRE ONLY THE MINIMUM NECESSARY TO OPERATE 4.10 MAXIMIZE EFFICIENCY 4.11 MINIMIZE NEW INVENTIONS | 8 8 8 9 9 9 9 9 9 9 10 |
| 5. OVERVIEW OF NetBIOS 5.1 INTERFACE TO APPLICATION PROGRAMS 5.2 NAME SERVICE 5.3 SESSION SERVICE 5.4 DATAGRAM SERVICE 5.5 MISCELLANEOUS FUNCTIONS 5.6 NON-STANDARD EXTENSIONS | 10 10 11 12 13 14 15 |
| 6. NetBIOS FACILITIES SUPPORTED BY THIS STANDARD | 15 |
| 7. REQUIRED SUPPORTING SERVICE INTERFACES AND DEFINITIONS | 15 |
| 8. RELATED PROTOCOLS AND SERVICES | 16 |
| 9. NetBIOS SCOPE | 16 |
| <pre>10. NetBIOS END-NODES 10.1 BROADCAST (B) NODES 10.2 POINT-TO-POINT (P) NODES 10.3 MIXED MODE (M) NODES</pre> | 16 16 16 16 |
| <pre>11. NetBIOS SUPPORT SERVERS 11.1 NetBIOS NAME SERVER (NBNS) NODES 11.1.1 RELATIONSHIP OF THE NBNS TO THE DOMAIN NAME SYSTEM 11.2 NetBIOS DATAGRAM DISTRIBUTION SERVER (NBDD) NODES 11.3 RELATIONSHIP OF NBNS AND NBDD NODES 11.4 RELATIONSHIP OF NEtBIOS SUPPORT SERVERS AND B NODES 12. TOPOLOGIES 12.1 LOCAL</pre> | 18 19 19 20 20 20 20 |

[Page 3]

DOCKET A L A R M Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

| 12.1.1 B NODES ONLY 12.1.2 P NODES ONLY 12.1.3 MIXED B AND P NODES | 21 21 21 |
|---|----------------|
| 12.2 INTERNET | 21 |
| 12.2 INTERNET 12.2.1 P NODES ONLY | 22 |
| 12.2.2 MIXED M AND P NODES | 23 |
| | 25 |
| 13. GENERAL METHODS | 23 |
| 13.1 REQUEST/RESPONSE INTERACTION STYLE | 23 |
| 13.1.1 RETRANSMISSION OF REQUESTS | 24 |
| 13.1.2 REQUESTS WITHOUT RESPONSES: DEMANDS | 24 |
| 13.2 TRANSACTIONS | 25 |
| 13.2.1 TRANSACTION ID | 25 |
| 13.3 TCP AND UDP FOUNDATIONS | 25 |
| 14. REPRESENTATION OF NETBIOS NAMES | 25 |
| 14.1 FIRST LEVEL ENCODING | 26 |
| 14.2 SECOND LEVEL ENCODING | 27 |
| | 0.7 |
| 15. NetBIOS NAME SERVICE | 27 27 |
| 15.1 OVERVIEW OF NetBIOS NAME SERVICE 15.1.1 NAME REGISTRATION (CLAIM) | 27 |
| 15.1.2 NAME QUERY (DISCOVERY) | 27 |
| 15.1.3 NAME RELEASE | 28 |
| 15.1.3.1 EXPLICIT RELEASE | 28 |
| 15.1.3.2 NAME LIFETIME AND REFRESH | 29 |
| 15.1.3.3 NAME CHALLENGE | 29 |
| 15.1.3.4 GROUP NAME FADE-OUT | 29 |
| 15.1.3.5 NAME CONFLICT | 30 |
| 15.1.4 ADAPTER STATUS | 31 |
| 15.1.5 END-NODE NBNS INTERACTION | 31 |
| 15.1.5.1 UDP, TCP, AND TRUNCATION | 31 |
| 15.1.5.2 NBNS WACK | 32 |
| 15.1.5.3 NBNS REDIRECTION | 32 |
| 15.1.6 SECURED VERSUS NON-SECURED NBNS | 32 |
| 15.1.7 CONSISTENCY OF THE NBNS DATA BASE | 32 |
| 15.1.8 NAME CACHING | 34 |
| 15.2 NAME REGISTRATION TRANSACTIONS | 34 |
| 15.2.1 NAME REGISTRATION BY B NODES | 34 |
| 15.2.2 NAME REGISTRATION BY P NODES | 35 |
| 15.2.2.1 NEW NAME, OR NEW GROUP MEMBER | 35 |
| 15.2.2.2 EXISTING NAME AND OWNER IS STILL ACTIVE | 36 |
| 15.2.2.3 EXISTING NAME AND OWNER IS INACTIVE | 37 |
| 15.2.3 NAME REGISTRATION BY M NODES | 38 |
| 15.3 NAME QUERY TRANSACTIONS | 39 |
| 15.3.1 QUERY BY B NODES | 39 40 |
| 15.3.2 QUERY BY P NODES 15.3.3 QUERY BY M NODES | 40 43 |
| 15.3.4 ACQUIRE GROUP MEMBERSHIP LIST | 43 |
| 15.4 NAME RELEASE TRANSACTIONS | 44 |
| 15.4.1 RELEASE BY B NODES | 44 |
| | _ |

DOCKET A L A R M [Page 4]

| 15.4.2 RELEASE BY P NODES | 44 |
|---|----------|
| 15.4.3 RELEASE BY M NODES 15.5 NAME MAINTENANCE TRANSACTIONS | 44 45 |
| 15.5.1 NAME REFRESH | 45 |
| 15.5.2 NAME CHALLENGE | 46 |
| 15.5.3 CLEAR NAME CONFLICT | 47 |
| 15.6 ADAPTER STATUS TRANSACTIONS | 47 |
| 16. NetBIOS SESSION SERVICE | 48 |
| 16.1 OVERVIEW OF NetBIOS SESSION SERVICE | 49 |
| 16.1.1 SESSION ESTABLISHMENT PHASE OVERVIEW | 49 |
| 16.1.1.1 RETRYING AFTER BEING RETARGETTED | 50 |
| 16.1.1.2 SESSION ESTABLISHMENT TO A GROUP NAME | 51 |
| 16.1.2 STEADY STATE PHASE OVERVIEW | 51 |
| 16.1.3 SESSION TERMINATION PHASE OVERVIEW | 51 |
| 16.2 SESSION ESTABLISHMENT PHASE | 52 |
| 16.3 SESSION DATA TRANSFER PHASE 16.3.1 DATA ENCAPSULATION | 54 54 |
| 16.3.2 SESSION KEEP-ALIVES | 54 |
| 17. NETBIOS DATAGRAM SERVICE | 55 |
| 17.1 OVERVIEW OF NetBIOS DATAGRAM SERVICE | 55 |
| 17.1.1 UNICAST, MULTICAST, AND BROADCAST | 55 |
| 17.1.2 FRAGMENTATION OF NetBIOS DATAGRAMS | 55 |
| 17.2 NetBIOS DATAGRAMS BY B NODES | 57 |
| 17.3 NetBIOS DATAGRAMS BY P AND M NODES | 58 |
| 18. NODE CONFIGURATION PARAMETERS | 58 |
| 19. MINIMAL CONFORMANCE | 59 |
| REFERENCES | |
| APPENDIX A | |
| INTEGRATION WITH INTERNET GROUP MULTICASTING | 61 |
| A-1. ADDITIONAL PROTOCOL REQUIRED IN B AND M NODES | 61 |
| A-2. CONSTRAINTS | 01 61 |
| | |
| APPENDIX B | 62 |
| IMPLEMENTATION CONSIDERATIONS | 62 |
| B-1. IMPLEMENTATION MODELS | 62 |
| B-1.1 MODEL INDEPENDENT CONSIDERATIONS | 63 |
| B-1.2 SERVICE OPERATION FOR EACH MODEL | 63 |
| B-2. CASUAL AND RESTRICTED NetBIOS APPLICATIONS | 64 |
| B-3. TCP VERSUS SESSION KEEP-ALIVES | 66 |
| B-4. RETARGET ALGORITHMS B-5. NBDD SERVICE | 67 68 |
| B-5. NBDD SERVICE B-6. APPLICATION CONSIDERATIONS | 68 |
| B-6.1 USE OF NetBIOS DATAGRAMS | 68 |
| | |

[Page 5]

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.