March, 1987

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

DOCKET

[Page 1]

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

SUMMARY OF CONTENTS

1.	STATUS OF THIS MEMO	б
2.	ACKNOWLEDGEMENTS	б
3.	INTRODUCTION	7
4.	DESIGN PRINCIPLES	7
5.	OVERVIEW OF NetBIOS	10
б.	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
APPENDIX A - INTEGRATION WITH INTERNET GROUP MULTICASTING		61
APPENDIX B - IMPLEMENTATION CONSIDERATIONS		62

NetBIOS Working Group

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

TABLE OF CONTENTS

1. STATUS OF THIS MEMO	б
2. ACKNOWLEDGEMENTS	6
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 	8 8 8 9 9 9 9 9
4.10 MAXIMIZE EFFICIENCY 4.11 MINIMIZE NEW INVENTIONS	10 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 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
 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 	18 19 19 20 20 20 20

NetBIOS Working Group

[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	21
12.1.2 P NODES ONLY	21
12.1.3 MIXED B AND P NODES	21
12.2 INTERNET	22
12.2.1 P NODES ONLY	22
12.2.2 MIXED M AND P NODES	23
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
	25
14. REPRESENTATION OF NETBIOS NAMES	-
14.1 FIRST LEVEL ENCODING	26
14.2 SECOND LEVEL ENCODING	27
15. NetBIOS NAME SERVICE	27
15.1 OVERVIEW OF NetBIOS NAME SERVICE	27
15.1.1 NAME REGISTRATION (CLAIM)	27
15.1.2 NAME QUERY (DISCOVERY)	28
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 STILL ACTIVE	30
15.2.3 NAME REGISTRATION BY M NODES	38
	30 39
15.3 NAME QUERY TRANSACTIONS	39 39
15.3.1 QUERY BY B NODES	39 40
15.3.2 QUERY BY P NODES	40 43
15.3.3 QUERY BY M NODES	43 43
15.3.4 ACQUIRE GROUP MEMBERSHIP LIST	43 44
15.4 NAME RELEASE TRANSACTIONS	44 44
15.4.1 RELEASE BY B NODES	44

NetBIOS Working Group

[Page 4]

15.4.2 RELEASE BY P NODES	44
15.4.3 RELEASE BY M NODES	44
15.5 NAME MAINTENANCE TRANSACTIONS	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	54
16.3.1 DATA ENCAPSULATION	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	60
KEF ERENCES	00
APPENDIX A	61
INTEGRATION WITH INTERNET GROUP MULTICASTING	61
A-1. ADDITIONAL PROTOCOL REQUIRED IN B AND M NODES	61
A-2. CONSTRAINTS	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	67
B-5. NBDD SERVICE	68
B-6. APPLICATION CONSIDERATIONS	68
B-6.1 USE OF NetBIOS DATAGRAMS	68

NetBIOS Working Group

[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.