AMR FLEET COMMUNICATION PROTOCOL REFERENCE

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Document ID: PROTO-2024-001

Version: 3.2

Effective Date: January 15, 2024

Classification: CONFIDENTIAL - Internal Use Only

1. PURPOSE AND SCOPE

1. This Protocol Reference Document ("Protocol") establishes the ma

2. This Protocol applies to all NaviFloor AMR units operating within Ve

2. DEFINITIONS

1. "Primary Communication Channel" means the dedicated 5GHz wire

2. "Secondary Communication Channel" means the backup communi

3. "Fleet Control Node" or "FCN" means the central processing unit re

4. "Robot Communication Module" or "RCM" means the onboard hard

3. COMMUNICATION ARCHITECTURE

1. Hierarchical Structure

a) Level 1: Fleet Control Node (Master)

b) Level 2: Zone Control Nodes

c) Level 3: Individual AMR Units

d) Level 4: Peripheral Sensors and Systems

2. Communication Pathways

a) Primary Path: Direct FCN to RCM communication

b) Secondary Path: Mesh network topology between AMR units

c) Emergency Path: Cellular backup system (where available)

4. PROTOCOL SPECIFICATIONS

1. Data Transmission Standards

a) Packet Size: Maximum 1024 bytes

b) Encryption: AES-256 with rotating keys

c) Transmission Rate: 100ms intervals (standard mode)

d) Error Checking: CRC-32 with automatic retry

2. Priority Levels

a) Priority 1: Emergency Commands

b) Priority 2: Navigation Updates

c) Priority 3: Status Reports

d) Priority 4: Diagnostic Data

5. SECURITY REQUIREMENTS

1. All communication channels must implement:

a) End-to-end encryption

b) Certificate-based authentication

c) Rotating security tokens

d) Intrusion detection monitoring

2. Security Protocols

a) Token Refresh: Every 4 hours

b) Certificate Rotation: Every 24 hours

c) Encryption Key Updates: Every 12 hours

6. FAILURE MODES AND RECOVERY

1. Communication Loss Procedures

a) Immediate switch to Secondary Channel

b) Implementation of Local Autonomy Mode

c) Activation of Emergency Protocols

2. Recovery Sequence

a) Channel verification

b) Authentication renewal

c) System state synchronization

d) Normal operation resumption

7. PERFORMANCE REQUIREMENTS

1. Latency Standards

a) Primary Channel: <50ms

b) Secondary Channel: <100ms

c) Emergency Channel: <250ms

2. Reliability Metrics

a) Uptime: 99.99%

b) Packet Loss: <0.01%

c) Error Rate: <0.001%

8. COMPLIANCE AND TESTING

1. All AMR units must undergo communication compliance testing:

a) Initial deployment certification

b) Quarterly performance validation

c) Post-update verification

d) Annual full system audit

9. PROPRIETARY RIGHTS

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10. DOCUMENT CONTROL

1. This Protocol is maintained by the NaviFloor Technical Documenta

2. Revision History:

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v3.2: January 15, 2024

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v3.1: October 1, 2023

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v3.0: June 15, 2023

APPROVAL AND AUTHORIZATION

APPROVED AND ADOPTED by NaviFloor Robotics, Inc.

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