WIRELESS COMMUNICATION PROTOCOL FOR ROBOT FLEET MANAGEMENT

WIRELESS COMMUNICATION PROTOCOL F

NaviFloor Robotics, Inc.

Proprietary & Confidential

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1. PURPOSE AND SCOPE

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1. This Wireless Communication Protocol ("Protocol") establishes the techni

2. This Protocol applies to all NaviFloor AMR deployments utilizing the Nav

2. DEFINITIONS

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1. "Mesh Network" refers to the decentralized wireless network topology ena

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2. "Fleet Control Node" means the primary hardware controller managing loc

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3. "Handshake Protocol" means the authenticated connection establishment p

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4. "Terrain Data Packet" means the standardized data structure containing Li

3. TECHNICAL SPECIFICATIONS

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1. Wireless Standards

a) Primary Protocol: IEEE 802.11ax (Wi-Fi 6)

b) Secondary Protocol: IEEE 802.15.4 (Mesh Network)

c) Fallback Protocol: IEEE 802.11ac

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2. Frequency Bands

a) Primary Band: 5 GHz (5.150-5.850 GHz)

b) Secondary Band: 2.4 GHz (2.400-2.483 GHz)

c) Emergency Band: 900 MHz (902-928 MHz)

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3. Security Standards

a) Encryption: AES-256-GCM

b) Authentication: WPA3-Enterprise

c) Certificate Authority: NaviFloor Root CA

4. COMMUNICATION ARCHITECTURE

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1. Hierarchical Control Structure

a) Level 1: Central Fleet Management System

b) Level 2: Zone Controllers

c) Level 3: Individual AMR Units

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2. Mesh Network Configuration

a) Maximum Nodes per Mesh: 128

b) Minimum Node Redundancy: 3

c) Maximum Hop Count: 5

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3. Quality of Service (QoS)

a) Maximum Latency: 50ms

b) Minimum Bandwidth: 10 Mbps per AMR

c) Packet Loss Threshold: 0.1%

5. OPERATIONAL PROCEDURES

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1. Network Initialization

a) Bootstrap Process

b) Node Discovery

c) Mesh Formation

d) Security Handshake

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2. Normal Operation

a) Periodic Health Checks

b) Load Balancing

c) Dynamic Route Optimization

d) Collision Avoidance Communication

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3. Fault Handling

a) Communication Loss Procedures

b) Failover Protocols

c) Emergency Stop Broadcasting

d) System Recovery

6. SECURITY MEASURES

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1. Access Control

a) Role-Based Authentication

b) Certificate Management

c) Key Rotation Schedule

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2. Monitoring and Logging

a) Security Event Logging

b) Performance Metrics

c) Compliance Auditing

7. COMPLIANCE AND TESTING

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1. Regulatory Compliance

a) FCC Part 15

b) CE Mark Requirements

c) ISO/IEC 27001

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2. Testing Requirements

a) Initial Deployment Testing

b) Periodic Performance Validation

c) Security Penetration Testing

8. PROPRIETARY RIGHTS

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1. All aspects of this Protocol, including but not limited to the communicatio

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2. No part of this Protocol may be reproduced, modified, or distributed witho

9. REVISION CONTROL

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1. This Protocol shall be reviewed and updated annually or as required by tec

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2. All revisions must be approved by the Chief Technology Officer and Chie

10. CERTIFICATION

The undersigned hereby certifies that this Protocol has been reviewed and approved for implementation.

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Marcus Depth

Chief Technology Officer

NaviFloor Robotics, Inc.

Date: January 15, 2024

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Dr. Elena Kovacs
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Chief Research Officer

NaviFloor Robotics, Inc.

Date: January 15, 2024

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