**Zoom VDI Audio/Video Redirection Plugin for macOS**

A custom plugin that enhances Zoom's VDI capabilities by providing seamless audio and video redirection from Cloud PCs (Windows 365, Azure Virtual Desktop) to local Mac devices.

**Features**

* **Real-time Audio Redirection**: High-quality audio streaming from Cloud PC to Mac
* **Video Stream Forwarding**: Efficient video capture and transmission
* **Low Latency Processing**: Optimized for real-time communication
* **Hardware Acceleration**: Leverages macOS native frameworks for optimal performance
* **Automatic Device Detection**: Smart detection and configuration of audio/video devices
* **Network Resilience**: Robust connection handling with automatic reconnection
* **Security**: Encrypted data transmission and secure device access

**System Requirements**

**macOS (Local Machine)**

* **OS Version**: macOS 10.15 (Catalina) or later
* **Hardware**: Intel or Apple Silicon Mac
* **RAM**: Minimum 4GB, recommended 8GB+
* **Network**: Stable connection with minimum 2 Mbps bandwidth
* **Permissions**: Camera and microphone access required

**Cloud PC Environment**

* **OS**: Windows 10/11 with Windows 365 or Azure Virtual Desktop
* **Zoom Version**: Latest version with VDI support enabled
* **Network**: Low-latency connection to Mac (< 50ms recommended)

**Architecture Overview**

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│ Cloud PC (Windows) │

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│ │ Zoom Meeting │───▶│ Zoom VDI Client │ │

│ │ Application │ │ - Audio/Video Capture │ │

│ └─────────────────┘ │ - Network Transmission │ │

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│ Encrypted Stream

│ (TCP/UDP Port 9001)

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│ Local Mac │

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│ │ Zoom VDI Plugin (This Solution) │ │

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│ │ │ Network Manager │ │ Audio/Video Processors │ │ │

│ │ │ - Data Reception│ │ - AVAudioEngine Integration │ │ │

│ │ │ - Protocol │ │ - AVCaptureSession Management │ │ │

│ │ │ Handling │ │ - Real-time Processing │ │ │

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│ │ macOS Audio/Video System │ │

│ │ - Speakers/Headphones Output │ │

│ │ - Camera/Microphone Input │ │

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**Installation**

**Quick Install**

1. **Download the plugin package**:

bash

git clone https://github.com/yourcompany/zoom-vdi-plugin.git

cd zoom-vdi-plugin

1. **Run the setup script**:

bash

chmod +x setup.sh

./setup.sh

1. **Follow the prompts** to grant camera and microphone permissions

**Manual Installation**

If you prefer manual installation or need to customize the build:

1. **Install dependencies**:

bash

*# Install Xcode Command Line Tools if not present*

xcode-select --install

1. **Build the plugin**:

bash

make clean

make all

1. **Install to Zoom plugins directory**:

bash

make install

1. **Configure the plugin**:

bash

cp plugin.conf ~/Library/Application\ Support/zoom.us/vdi\_plugin.conf

**Configuration**

**Plugin Configuration File**

Location: ~/Library/Application Support/zoom.us/vdi\_plugin.conf

json

{

"zoom\_vdi\_plugin": {

"enabled": true,

"auto\_start": true,

"log\_level": "info",

"network": {

"listen\_port": 9001,

"timeout\_ms": 5000,

"buffer\_size": 4096,

"max\_connections": 10

},

"audio": {

"enabled": true,

"sample\_rate": 44100,

"channels": 2,

"bit\_depth": 16,

"echo\_cancellation": true,

"noise\_suppression": true,

"auto\_gain\_control": true

},

"video": {

"enabled": true,

"resolution": "1920x1080",

"fps": 30,

"bitrate\_kbps": 2500,

"hardware\_acceleration": true,

"quality": "high"

},

"security": {

"encryption\_enabled": true,

"allowed\_hosts": ["\*"],

"require\_authentication": false

}

}

}

**Cloud PC Configuration**

On your Cloud PC, configure Zoom to use VDI optimization:

1. **Open Zoom Settings**
2. **Navigate to General > Advanced**
3. **Enable "Optimize for thin client"**
4. **Set VDI environment to "Other"**
5. **Configure the Mac IP address and port 9001**

**Network Configuration**

**Firewall Settings (macOS)**

bash

*# Allow incoming connections on port 9001*

sudo /usr/libexec/ApplicationFirewall/socketfilterfw --add /path/to/ZoomVDIPlugin

sudo /usr/libexec/ApplicationFirewall/socketfilterfw --unblockapp /path/to/ZoomVDIPlugin

**Router/Network Configuration**

* Ensure port 9001 is open between Cloud PC and Mac
* For corporate networks, work with IT to allow traffic
* Consider VPN if connecting across different networks

**Usage**

**Starting a VDI Session**

1. **Start the plugin** (if not auto-starting):

bash

*# The plugin should start automatically when Zoom VDI connects*

*# Manual start (if needed):*

launchctl load ~/Library/LaunchAgents/com.yourcompany.zoom.vdi.helper.plist

1. **Launch Zoom on Cloud PC**
2. **Join a meeting** - audio/video should automatically redirect to your Mac

**Monitoring Plugin Status**

**Check Plugin Logs**

bash

*# View real-time logs*

tail -f /tmp/zoom\_vdi\_plugin.log

*# View system logs*

log show --predicate 'subsystem == "com.yourcompany.zoom.vdi.helper"' --last 1h

**Network Connection Status**

bash

*# Check if plugin is listening*

lsof -i :9001

*# Monitor network connections*

netstat -an | grep 9001

**Troubleshooting**

**Common Issues**

**Plugin Not Loading**

bash

*# Check plugin permissions*

ls -la ~/Library/Application\ Support/zoom.us/plugins/ZoomVDIHelper.bundle

*# Verify code signature*

codesign -v ~/Library/Application\ Support/zoom.us/plugins/ZoomVDIHelper.bundle

**Audio/Video Not Redirecting**

1. Verify camera/microphone permissions in System Preferences
2. Check if other applications are using audio/video devices
3. Restart the plugin:

bash

launchctl unload ~/Library/LaunchAgents/com.yourcompany.zoom.vdi.helper.plist

launchctl load ~/Library/LaunchAgents/com.yourcompany.zoom.vdi.helper.plist

**Network Connection Issues**

1. Test network connectivity between Cloud PC and Mac
2. Verify firewall settings
3. Check for corporate proxy/VPN interference

**Debug Mode**

Enable debug logging by modifying the configuration:

json

{

"zoom\_vdi\_plugin": {

"log\_level": "debug",

"debug\_mode": true

}

}

**Performance Optimization**

**Audio Settings**

* **Low Latency**: Set buffer size to 1024 for minimal delay
* **High Quality**: Use 48kHz sample rate for best audio quality
* **Bandwidth Limited**: Reduce channels to mono and sample rate to 22kHz

**Video Settings**

* **Low Bandwidth**: Reduce resolution to 720p and fps to 15
* **High Quality**: Use 1080p at 30fps with hardware acceleration
* **Ultra-Low Latency**: Disable video enhancement features

**Network Optimization**

json

{

"network": {

"buffer\_size": 1024, *// Smaller for low latency*

"timeout\_ms": 1000, *// Aggressive timeout*

"tcp\_nodelay": true, *// Disable Nagle's algorithm*

"socket\_priority": "high"

}

}

**Security Considerations**

**Data Encryption**

* All audio/video data is encrypted in transit using TLS 1.3
* Plugin validates certificates and uses secure cipher suites
* No data is stored locally or logged in plain text

**Access Control**

json

{

"security": {

"allowed\_hosts": ["192.168.1.100", "10.0.0.0/8"],

"require\_authentication": true,

"auth\_token": "your-secure-token-here"

}

}

**Privacy Protection**

* Camera/microphone access only when Zoom VDI is active
* No persistent storage of audio/video data
* Automatic cleanup of temporary buffers

**Development**

**Building from Source**

bash

*# Clone the repository*

git clone https://github.com/yourcompany/zoom-vdi-plugin.git

cd zoom-vdi-plugin

*# Build debug version*

make debug

*# Run tests*

make test

*# Create signed release*

make codesign

*# Package for distribution*

make package

**Plugin Architecture**

The plugin consists of several key components:

* **ZoomVDIPlugin**: Main plugin class and coordination
* **NetworkManager**: Handles TCP/UDP connections with Cloud PC
* **AudioManager**: Manages AVAudioEngine and audio processing
* **VideoManager**: Controls AVCaptureSession and video streams
* **CodecManager**: Handles audio/video encoding/decoding

**API Documentation**

For developers wanting to extend or integrate with the plugin, see the [API Documentation](docs/API.md).

**Uninstallation**

**Automated Uninstall**

bash

./uninstall.sh

**Manual Removal**

bash

*# Remove plugin bundle*

rm -rf ~/Library/Application\ Support/zoom.us/plugins/ZoomVDIHelper.bundle

*# Remove configuration*

rm -f ~/Library/Application\ Support/zoom.us/vdi\_plugin.conf

*# Remove launch agent (if installed)*

launchctl unload ~/Library/LaunchAgents/com.yourcompany.zoom.vdi.helper.plist

rm -f ~/Library/LaunchAgents/com.yourcompany.zoom.vdi.helper.plist

*# Remove logs*

rm -f /tmp/zoom\_vdi\_plugin.log

**Support**

**Getting Help**

* **Documentation**: Check this README and included docs
* **Issues**: Report bugs on GitHub Issues
* **Community**: Join our Discord server for community support
* **Enterprise**: Contact enterprise support for business deployments

**Reporting Issues**

When reporting issues, please include:

* macOS version and hardware details
* Cloud PC environment details
* Plugin version and configuration
* Relevant log excerpts
* Steps to reproduce the issue

**Contributing**

We welcome contributions! Please see <CONTRIBUTING.md> for guidelines.

**License**

This project is licensed under the MIT License - see the <LICENSE> file for details.

**Changelog**

**Version 1.0.0**

* Initial release
* Basic audio/video redirection
* macOS integration
* Configuration system
* Logging and monitoring

**Note**: This plugin is designed to work with Zoom's official VDI infrastructure. Ensure you have proper licensing for Zoom VDI features in your Cloud PC environment.