

Nginx Configuration Guide

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Preface

DFdiscover Release 5.10.3

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Getting Help

For software support, Please contact the DFdiscover team:

- via email, help@dfnetresearch.com.
- Visit our website, <https://www.dfnetresearch.com>.

Conventions

A number of conventions have been used throughout this document.

Any freestanding sections of code are generally shown like this:

```
# this is example code
code = code + overhead;
```

If a line starts with # or %, this character denotes the system prompt and is not typed by the user.

Text may also have several styles:

- Emphasized words are shown as follows: *emphasized* words.
- Filenames appear in the text like so: `dummy.c`.
- Code, constants, and literals in the text appear like so: `main.c`.
- Variable names appear in the text like so: `nBytes`.
- Text on user interface labels or menus is shown as: **Printer name**, while buttons in user interfaces are shown as `Button`.
- Menus and menu items are shown as: `File` > `Exit`.

DFdiscover Web Applications - NGINX Setup Documentation

Overview

This document describes the configuration and architecture of the DFdiscover web application suite running on `example.com` with multiple network interfaces configured. The system uses nginx as a reverse proxy to route traffic to three backend applications: DFweb, DFengage, and DFws.

This system uses multiple network interfaces with the following configuration:

Component	Network Interface	IP Address	Port
DFdiscover	NIC1	10.2.0.9	443
Nginx Reverse Proxy	NIC2	10.2.0.4	443
DFweb	NIC2	10.2.0.4	8443
DFengage	NIC2	10.2.0.4	9443
DFws	NIC2	10.2.0.4	4433

IMPORTANT: The specific IP addresses (10.2.0.4 and 10.2.0.9) are only required in the configurations due to multiple services running on the same server with multiple network interfaces. If you are deploying these applications on separate servers (one application per server), you do not need to specify IP addresses for port binding—the applications can bind to all available interfaces (0.0.0.0) by default.

When to specify IP binding:

- Multiple applications on one server with multiple NICs
- Need to isolate traffic on specific network interfaces
- Single application per server (IP binding not required)
- Server has only one network interface (IP binding not required)

Network Configuration

- **Public Entry Point:** `https://example.com` (Port 443)
- **Server IP:** `10.2.0.4`
- **Protocol:** HTTPS with TLS 1.3 encryption
- **SSL Certificates:**
 - **Certificate:** `/etc/ssl/certs/server.crt`
 - **Private Key:** `/etc/ssl/private/server.key`

Nginx Reverse Proxy Configuration

The main nginx configuration is located at: `/etc/nginx/conf.d/default.conf`

Complete Server Block Configuration

```
``nginx server { listen 10.2.0.4:443 ssl http2; server_name example.com;

ssl_certificate /etc/ssl/certs/server.crt; ssl_certificate_key /etc/ssl/private/server.key; ssl_protocols TLSv1.3;

client_max_body_size 50M; server_tokens off; merge_slashes off;

# ----- DFWEB (Priority Match) ----- location ^~ /dfweb/ { proxy_pass
https://example.com:8443/dfweb/; proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
    proxy_set_header X-Forwarded-Port 443;

    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";

    proxy_ssl_server_name on;
    proxy_ssl_verify off;
}

location = /dfweb { return 301 /dfweb/?$args; }

# ----- DFENGAGE (Priority Match) ----- location ^~ /dfengage/ { proxy_pass
https://example.com:9443/dfengage/; proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
    proxy_set_header X-Forwarded-Port 443;

    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";
```

```

    proxy_ssl_server_name on;
    proxy_ssl_verify off;
}
location = /dfengage { return 301 /dfengage/?$args; }
#----- DFWS (Priority Match) ----- location ^~/dfws/ { proxy_pass https://example.com:4433;
proxy_http_version 1.1;

    # FORCE the Host header to match what the backend expects
    proxy_set_header Host example.com;

    # SNI must match the certificate CN=*.example.com
    proxy_ssl_server_name on;
    proxy_ssl_name example.com;

    # Matches the TLS version seen in your curl output
    proxy_ssl_protocols TLSv1.3;

    # Standard proxy headers
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;

    proxy_ssl_verify off;
}
#----- DFENGAGE (Catch-all, must be last) ----- # DFWEB Catch-all modify proxy_pass
/dfengage to /dfweb ----- location / { proxy_pass https://example.com:9443/dfengage; proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
    proxy_set_header X-Forwarded-Port 443;

    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";

    proxy_ssl_verify off;
    proxy_ssl_server_name on;
}}`

```

Server-Level Directives

Directive	Value	Purpose
<code>listen</code>	<code>10.2.0.4:443 ssl http2</code>	Binds to specific IP (exclude IP if you are not utilizing multiple NIC's), enables SSL/TLS and HTTP/2
<code>server_name</code>	<code>example.com</code>	Defines the domain name for this server block
<code>ssl_certificate</code>	<code>/etc/ssl/certs/server.crt</code>	Path to SSL certificate file
<code>ssl_certificate_key</code>	<code>/etc/ssl/private/server.key</code>	Path to SSL private key
<code>ssl_protocols</code>	<code>TLSv1.3</code>	Restricts to TLS 1.3 only (most secure)
<code>client_max_body_size</code>	<code>50M</code>	Maximum allowed size for file uploads
<code>server_tokens</code>	<code>off</code>	Hides nginx version in response headers
<code>merge_slashes</code>	<code>off</code>	Prevents URL path traversal attacks

Location Block Priority

The location blocks are processed in this specific order:

1. **Exact Match Redirects** (`location = /dfweb` and `location = /dfengage`)
 - Returns 301 redirect to add trailing slash
 - Ensures consistent URL formatting
2. **Priority Prefix Matches** (`location ^~ /path/`)
 - `/dfweb/` → Routes to DFweb application on port 8443
 - `/dfengage/` → Routes to DFengage application on port 9443
 - `/dfws/` → Routes to DFws API on port 4433
3. **Catch-All Match** (`location /`)
 - Routes all other requests to DFengage (default application)

NOTE: Configurations can be modified for the default application of **DFweb** by modifying the `proxy_pass`
`https://example.com:9443/dfengage;` values to `proxy_pass`
`https://example.com:8443/dfweb;`

Proxy Headers

The following headers are set for all proxied requests to preserve client information:

Header	Purpose	Example Value
Host	Original hostname	example.com
X-Real-IP	Client's actual IP address	192.168.1.100
X-Forwarded-For	Chain of proxy IPs	192.168.1.100, 10.2.0.4
X-Forwarded-Proto	Original protocol	https
X-Forwarded-Port	Original port	443

WebSocket Support

All applications support WebSocket connections for real-time communication:

- **Header Forwarding:** Standard WebSocket upgrade headers are preserved
- **Protocol Upgrade:** HTTP/1.1 with upgrade to WebSocket protocol
- **Connection:** Set to "upgrade" for persistent connections

Security Features

- **Protocol:** TLS 1.3 only (most secure version)
- **Certificate:** Wildcard certificate for *.example.com
- **Server Tokens:** Disabled (hides nginx version information)
- **Upload Limits:** Maximum 50 MB file uploads
- **Additional Security:**
 - URL slash merging is disabled to prevent path traversal attacks
 - Backend SSL verification is disabled (internal network trust)
 - All traffic is encrypted end-to-end

DFweb Application configuration for Nginx

Access Information

- **Primary URL:** https://example.com/dfweb/
- **Backend Port:** 8443
- **Base Directory:** /opt/dfweb/

IMPORTANT: Accessing /dfweb without the trailing slash will automatically redirect to /dfweb/

Configuration

File Location: /opt/dfweb/environment.json

```
{  
  "dfws": "https://example.com",  
  "port": "8443",  
  "baseHref": "dfweb"  
}
```

IMPORTANT: The `dfws` value should contain **only the hostname**, not the `/dfws` path or the port number appended to the FQDN. The DFweb application automatically appends `/dfws/v5` when making API calls.

Configuration Details:

- Connects to DFws API at `https://example.com` (routes through nginx to port 4433)
- Runs on port 8443
- Base path is `/dfweb/`

Application Structure

- Client application (`/opt/dfweb/dist/client/index.html`): **Base href** `/dfweb/data/`
- Flutter application (`/opt/dfweb/dist/flutter/index.html`): **Base href** `/dfweb/`

Request Flow

1. User navigates to `https://example.com/dfweb/`
2. Request arrives at nginx on port 443
3. Nginx terminates TLS connection
4. Nginx forwards request to `https://example.com:8443/dfweb/`
5. DFweb application processes the request
6. Response travels back through nginx to the user

Nginx Location Block for DFweb

```
location ^~ /dfweb/ {
    proxy_pass https://example.com:8443/dfweb/;
    proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
    proxy_set_header X-Forwarded-Port 443;

    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";

    proxy_ssl_server_name on;
    proxy_ssl_verify off;
}

location = /dfweb {
    return 301 /dfweb/?$args;
}
```

Troubleshooting

Cannot access DFweb:

- Verify service is running: `systemctl status -l dfweb`
- Check port is listening: `netstat -tlnp | grep 8443`
- Ensure URL includes trailing slash: `/dfweb/`

API connection issues:

- Verify `environment.json` has correct `dfws` value (hostname only, do not specify a path of `/dfws` or port number)

specification : 4433.)

- Check nginx is proxying requests correctly
- Review nginx error logs: `/var/log/nginx/error.log`

DFengage Application

Access Information

- **Primary URL:** `https://example.com/dfengage/`
- **Backend Port:** 9443
- **Base Directory:** `/opt/dfengage/`
- **Default Application:** Also accessible via the root URL `https://example.com/`

Important: Accessing `/dfengage` without the trailing slash will automatically redirect to `/dfengage/`

Configuration

File Location: `/opt/dfengage/environment.json`

```
{
  "ip": "10.2.0.4",
  "port": "9443",
  "baseHref": "dfengage"
}
```

Configuration Details:

- Listens on IP 10.2.0.4
- Runs on port 9443
- Base path is `/dfengage/`

Application Structure

- Flutter application (`/opt/dfengage/dist/flutter/index.html`): **Base href** `/dfengage/`

Request Flow

1. User navigates to `https://example.com/dfengage/` (or just `/dfengage`)
2. Request arrives at nginx on port 443
3. Nginx terminates TLS connection
4. Nginx forwards request to `https://example.com:9443/dfengage`
5. DFengage application processes the request
6. Response travels back through nginx to the user

Nginx Location Blocks for DFengage

```
location ^~ /dfengage/ {
    proxy_pass https://example.com:9443/dfengage/;
    proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
}
```

```

proxy_set_header X-Forwarded-Port 443;

proxy_set_header Upgrade $http_upgrade;
proxy_set_header Connection "upgrade";

proxy_ssl_server_name on;
proxy_ssl_verify off;
}

location = /dfengage {
    return 301 /dfengage/?$args;
}

```

Catch-all route (default to DFengage)

```

location / {
    proxy_pass https://example.com:9443/dfengage;
    proxy_http_version 1.1;

    proxy_set_header Host $host;
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;
    proxy_set_header X-Forwarded-Port 443;

    proxy_set_header Upgrade $http_upgrade;
    proxy_set_header Connection "upgrade";

    proxy_ssl_verify off;
    proxy_ssl_server_name on;
}

```

NOTE: The catch-all route means any URL not matching specific paths (/dfweb/, /dfws/) will be routed to DFengage.

Troubleshooting

Cannot access DFengage:

- Verify service is running: `systemctl status -l dfengage`
- Check port is listening: `netstat -tlnp | grep 9443`
- Review application logs in `/opt/dfengage/` directory
- Ensure URL includes trailing slash: `/dfengage/`

Unexpected routing to DFengage:

- This is expected behavior - DFengage is the default application
- Any URL not matching `/dfweb/` or `/dfws/` will route to DFengage

DFws (Web Service API) Configuration for Nginx

Access Information

- **API Endpoint:** `https://example.com/dfws/`

- **Backend Port:** 4433
- **Base Directory:** /opt/dfws/

Important for Application Configuration

The `dfws` value specified in the `environment.json` file should contain **only the hostname**, not the `/dfws` path or the port number appended to the FQDN.

```
"dfws": "https://example.com"
```

NOTE: These applications automatically append `/dfws/v5` (or the appropriate API version path) to the base URL. The nginx reverse proxy then routes requests from `/dfws/` to the backend DFws service on port 4433.

API Call Flow Example

1. Application configured with: `"dfws": "https://example.com"`
2. Application makes request to: `https://example.com/dfws/v5/endpoint`
3. Nginx receives request at: `/dfws/v5/endpoint`
4. Nginx proxies to: `https://example.com:4433/dfws/v5/endpoint`
5. DFws service processes the request on port 4433

Incorrect Configuration (do not use):

```
"dfws": "https://example.com/dfws" **WRONG** - will result in /dfws/dfws/v5
```

Configuration

File Location: /opt/dfws/dfws.cf

```
DFWS_PORT=4433
DFWS_SSL_KEY=/etc/ssl/private/server.key
DFWS_SSL_CERT=/etc/ssl/certs/server.crt
DFWS_DATABASE=/opt/dfws/dfws.db
DFWS_REVERSE_PROXY=1
DFWS_HOST_FQDN=example.com
```

Core Settings

- **Port:** 4433 (HTTPS)
- **SSL Certificate:** /etc/ssl/certs/server.crt
- **SSL Key:** /etc/ssl/private/server.key
- **Database:** /opt/dfws/dfws.db (SQLite database for application data)
- **Reverse Proxy:** Enables DFWS to correctly determine the originating client IP address when traffic is routed through a proxy server.
- **Host_FQDN:** A configuration parameter to allow an external facing FQDN to be used in Forgot Password emails. This parameter is only required when an internal hostname is used for the API server's local hostname, in order for Forgot Password emails to work correctly.

Understanding DFWS_REVERSE_PROXY

Set `DFWS_REVERSE_PROXY=true` when DFws is deployed behind a reverse proxy. When enabled, **DFws** recognizes that incoming requests are forwarded and trusts standard proxy headers to determine the client's true network identity and request context:

X-Real-IP – the original client IP address **X-Forwarded-For** – the full proxy chain, with the client IP first
X-Forwarded-Proto – the external request scheme (https)

This allows **DFws** to:

- Record accurate client IP addresses in audit and access logs
- Apply authentication, session handling, and security logic based on the real client IP
- Generate correct login redirects and API responses that reflect the externally visible HTTPS endpoint rather than the internal backend port

When `DFWS_REVERSE_PROXY` is enabled, **DFws** does not rely on the proxy's source IP (such as the NGINX server address) and instead uses the forwarded headers provided by the reverse proxy.

Ensure that your reverse proxy explicitly forwards these headers on all `/dfws/` requests. The recommended NGINX location block for **DFws** already includes the required `X-Real-IP`, `X-Forwarded-For`, and `X-Forwarded-Proto` headers, enabling **DFws** to fully and accurately identify the originating client.

⚠ Warning If `DFWS_REVERSE_PROXY` is not enabled when **DFws** is behind NGINX, **DFws** will log and operate on the proxy's IP address instead of the real client IP, ignore the external request scheme, and may generate incorrect login redirects and audit records. Always enable this setting when using a reverse proxy.

Best Practice for Reverse Proxy Setup:

- This ensures API responses return links pointing to the public-facing URL (port 443) rather than the backend port (4433)
- Current configuration: `DFWS_HOST_FQDN=https://example.com` correctly returns links to the nginx proxy

Optional Configuration Settings

DFws is configured via properties in the `/opt/dfws/dfws.cf` file. Refer to [DFws Configuration File, DFws User Guide](#) for full details .

Nginx Location Block for DFws

The **DFws** location block has special configuration requirements for proper SSL/TLS handling:

```
location ^~ /dfws/ {
    proxy_pass https://example.com:4433;
    proxy_http_version 1.1;

    # FORCE the Host header to match what the backend expects
    proxy_set_header Host example.com;

    # SNI must match the certificate CN=*.example.com
    proxy_ssl_server_name on;
    proxy_ssl_name example.com;

    # Matches the TLS version seen in your curl output
    proxy_ssl_protocols TLSv1.3;

    # Standard proxy headers
    proxy_set_header X-Real-IP $remote_addr;
    proxy_set_header X-Forwarded-For $proxy_add_x_forwarded_for;
    proxy_set_header X-Forwarded-Proto https;

    proxy_ssl_verify off;
}
```

Why these settings are needed:

- **Host Header Override:** Forces the Host header to match backend expectations
- **SNI Configuration:** Ensures Server Name Indication (SNI) matches the wildcard certificate `*.example.com`
- **TLS Protocol Match:** Explicitly sets TLS 1.3 to match backend requirements

Troubleshooting

Cannot access DFws API:

- Verify service is running: `systemctl status -l dfws`
- Check port is listening: `netstat -tlnp | grep 4433`
- Review DFws logs in `/opt/dfws/` directory
- Verify SSL certificates exist and are valid

Applications cannot connect to API:

- **Common Cause:** Incorrect dfws configuration in application's `environment.json` (**DFweb or DFengage**)
 - Verify the dfws value contains **only the hostname**, not the `/dfws` path or port number:
 - `"dfws": "https://example.com"`
 - `"dfws": "https://example.com/dfws"`
- **Why:** Applications automatically append `/dfws/v5` to the base URL. Including `/dfws` in the configuration results in duplicate paths like `/dfws/dfws/v5`

General Troubleshooting

Connection Issues

Problem: Cannot access any application

- Ensure you're using HTTPS (not HTTP)
- Verify nginx is running: `systemctl status -l nginx`
- Verify DNS resolution: `nslookup example.com`
- Confirm server is reachable: `ping 10.2.0.4`

Problem: Upload fails

- File size must be under 50 MB
- **Solution:** Split large files or compress before uploading

SSL Certificate Issues

Problem: Browser shows certificate warning

- **Cause:** Certificate may be self-signed or expired
 - Verify certificate files exist at `/etc/ssl/certs/server.crt` and `/etc/ssl/private/server.key`
 - Certificate expiration: `openssl x509 -in /etc/ssl/certs/server.crt -noout -dates`
 - **Solution:** Contact your system administrator to renew certificates

502 Bad Gateway Errors

Problem: Receiving 502 errors when accessing applications

- **Cause:** Backend application is not running or not responding
- Verify backend services are running
- Review nginx error logs: `tail -f /var/log/nginx/error.log`
- Verify backend ports are listening (see Troubleshooting sections for each app)

Redirect Loop Issues

Problem: Browser shows "too many redirects" error

- **Cause:** Misconfiguration in proxy headers or base href settings
- Verify `X-Forwarded-Proto` is set to `https` in nginx configuration
- Ensure application base href matches nginx location blocks

Performance Issues

Problem: Slow response times

- Server resource usage: `top` or `htop`
- Nginx access logs for slow requests: `tail -f /var/log/nginx/access.log`
- **DFws** connection limits and database performance
- **Solution:** Enable verbose logging in **DFws**: uncomment `DFWS_LOG_THRESHOLD=4`

Administration Guide

Service Restart Order

After configuration changes, restart services in this order:

1. **DFws:** `systemctl restart dfws`
2. **DFweb:** `systemctl restart dfweb`
3. **DFengage:** `systemctl restart dfengage`
4. **Nginx:** `systemctl restart nginx` or `nginx -s reload`

NOTE: Use `nginx -t` to test configuration before restarting nginx.

Configuration File Locations

Component	Configuration File
Nginx	<code>/etc/nginx/conf.d/default.conf</code>
DFws	<code>/opt/dfws/dfws.cf</code>
DFweb	<code>/opt/dfweb/environment.json</code>
DFengage	<code>/opt/dfengage/environment.json</code>
SSL Certificates	<code>/etc/ssl/certs/server.crt</code> and <code>/etc/ssl/private/server.key</code>

Log File Locations

Component	Log Location
Nginx Access	/var/log/nginx/access.log
Nginx Error	/var/log/nginx/error.log
Nginx Service	journalctl -u nginx
DFws	Check /var/log/messages and /opt/dfws/DFwsadmin showlog
DFweb	Check /var/log/messages or journalctl -u dfweb
DFengage	Check /var/log/messages or journalctl -u dfengage

Testing Configuration Changes

Before applying changes to production:

1. **Test nginx configuration:** `nginx -t`
2. **Reload without downtime:** `nginx -s reload` (preferred over restart)
3. **Validate JSON files:** `python3 -m json.tool < /opt/dfweb/environment.json`
4. **Monitor logs during changes:** `tail -f /var/log/nginx/error.log`

Monitoring Commands

```
# Check all services status
systemctl status nginx dfws dfweb dfengage

# Check listening ports
netstat -tlnp | grep -E '443|4433|8443|9443'

# Monitor nginx access in real-time
tail -f /var/log/nginx/access.log

# Monitor nginx errors in real-time
tail -f /var/log/nginx/error.log

# Check SSL certificate expiration
openssl x509 -in /etc/ssl/certs/server.crt -noout -dates
```

Technical Specifications

Supported Features

- HTTPS (TLS 1.3)
- WebSocket connections
- HTTP/2 protocol
- Large file uploads (up to 50 MB)
- Session management
- Real-time communications
- Multiple concurrent users
- Server Name Indication (SNI)
- Reverse proxy with SSL passthrough

Network Requirements

- HTTPS access to port 443
- WebSocket support (no firewall blocking)
- DNS resolution for `example.com`

Common Error Codes

Error Code	Meaning	Common Causes
502 Bad Gateway	Backend not responding	Application down, port blocked
504 Gateway Timeout	Backend took too long	Performance issue, app hanging
413 Payload Too Large	Upload exceeds limit	File larger than 50 MB
301 Moved Permanently	Redirect to trailing slash	Missing trailing slash in URL

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d3.js

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jwt-cpp

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QXlsx

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