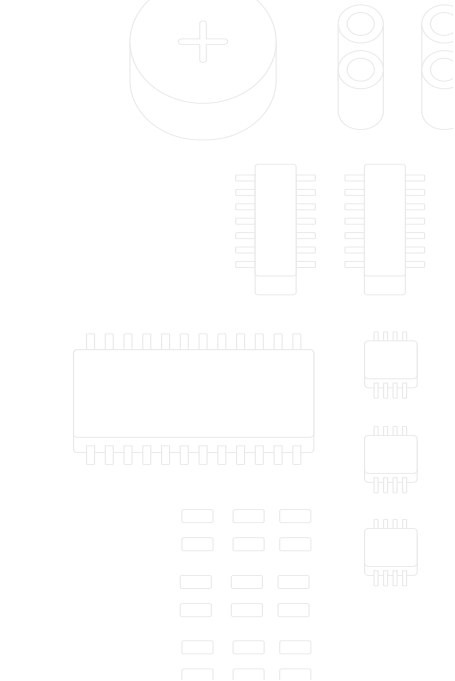# Integration of custom Web UIs into OpenWrt

Davor Popović

.sartura.

# About the presenter

- Davor Popović

**OpenVPN**

Overview » Instance "client_tun"

« Switch to basic configuration

Configuration category: Service | **Networking** | VPN | Cryptography

## Networking

| | | |
|---|---|---|
| float | ☑ | Allow remote to change its IP or port |
| nobind | ☑ | Do not bind to local address and port |
| dev | tap | |
| | | tun/tap device |
| tun_ipv6 | ☑ | Make tun device IPv6 capable |
| ifconfig_noexec | ☐ | Don't actually execute ifconfig |
| ifconfig_nowarn | ☐ | Don't warn on ifconfig inconsistencies |
| route | 10.0.0.0 255.0.0.0 | |
| | | Add route after establishing connection |
| route_gateway | 10.228.207.1 | |
| | | Specify a default gateway for routes |
| route_noexec | ☐ | Don't add routes automatically |
| mtu_test | ☐ | Empirically measure MTU |
| comp_lzo | ☑ | Use fast LZO compression |
| comp_noadapt | ☐ | Don't use adaptive lzo compression |
| ping_timer_rem | ☐ | Only process ping timeouts if routes exist |
| persist_tun | ☑ | Keep tun/tap device open on restart |
| persist_key | ☑ | Don't re-read key on restart |
| persist_local_ip | ☐ | Keep local IP address on restart |
| persist_remote_ip | ☐ | Keep remote IP address on restart |
| management | 127.0.0.1 31194 | |
| | | Enable management interface on *IP port* |
| management_query_passwords | ☐ | Query management channel for private key |
| management_hold | ☐ | Start OpenVPN in a hibernating state |

-- Additional Field -- ▾  ☐ Add

☐ Reset   ☐ Save   ☐ Save & Apply

## Media Server

**Configuration** : This page controls configuration and scanning of the cable modem's media server.

### Basic Settings

Media Server    ● Enabled    ○ Disabled

Media Server Name    [TC7200-DMS]

[ Apply Basic Settings ]

### Scan Settings

Scanning Method    ● Scan All Files
                         ○ Scan Files By Type

**Available File Types**

| Video | Audio | Image | Other |
|---|---|---|---|
| 3g2 | 3gp | bmp | |
| 3gp2 | aac | gif | |
| asf | ac3 | ico | |
| avc | aif | jpe | |
| avi | aiff | jpeg | |
| bin | at3p | jpg | |
| divx | au | pcd | |
| dv | cda | png | |
| flv | dts | pnm | |
| hdmov | flac | ppm | |
| iso | l16 | qtf | |
| m1v | lpcm | qti | |
| m2t | m4a | qtif | |
| m2ts | mid | tif | |
| m2v | mka | tiff | |
| m4p | mp1 | | |
| m4v | mp2 | | |
| mjpeg | mp3 | | |
| mjpg | mp4 | | |
| mkv | mpc | | |
| mov | ogg | | |
| mp2p | pcm | | |
| mp2t | ra | | |
| mp2v | ram | | |
| mp4 | rm | | |
| mp4ps | rmi | | |
| mpe | snd | | |
| mpeg | wav | | |
| mpeg2 | wave | | |
| mpeg4 | wma | | |
| mpg | | | |
| mpg2 | | | |
| mpg4 | | | |
| ogm | | | |
| qt | | | |
| rmv | | | |

**Selected File Types**

| Video | Audio | Image | Other |
|---|---|---|---|

| [ Selected > ] | [ Selected > ] | [ Selected > ] | [ Selected > ] |
| [ All Video >> ] | [ All Audio >> ] | [ All Image >> ] | [ All Other >> ] |

[ Add All Types >>> ]

| [ < Selected ] | [ < Selected ] | [ < Selected ] | [ < Selected ] |
| [ << All Video ] | [ << All Audio ] | [ << All Image ] | [ << All Other ] |

[ <<< Remove All Types ]

☐ Enable scheduled scanning period : [ 0 ]   minutes
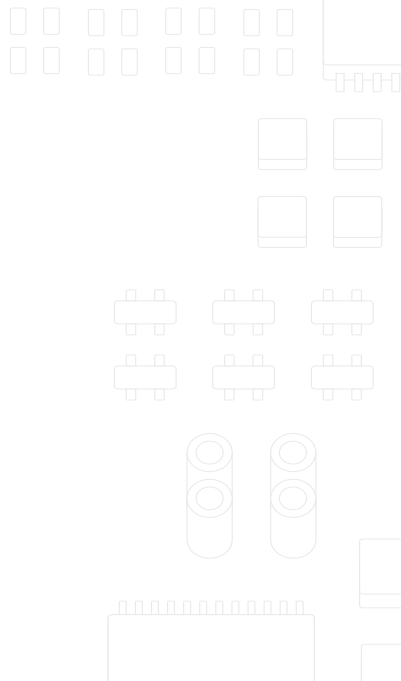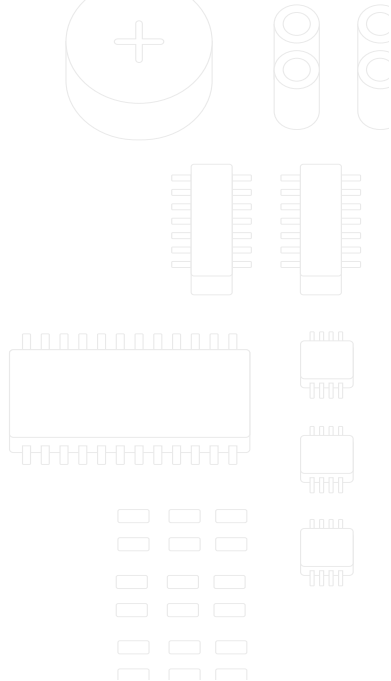
# Web UI

- Main communication with users

- Simplifies router setup and customization

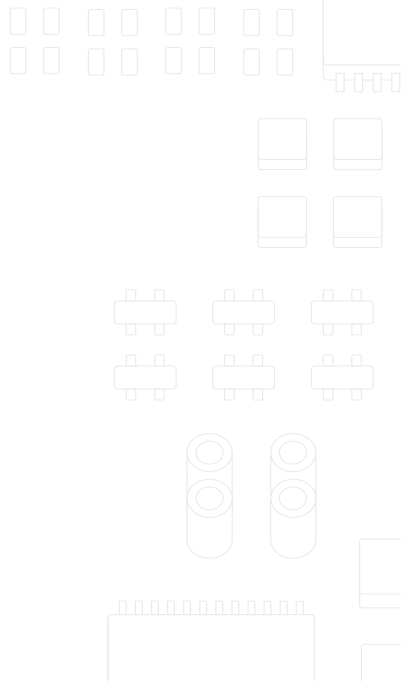- Displays router statistics and data

# Existing OpenWrt Web UI flavors
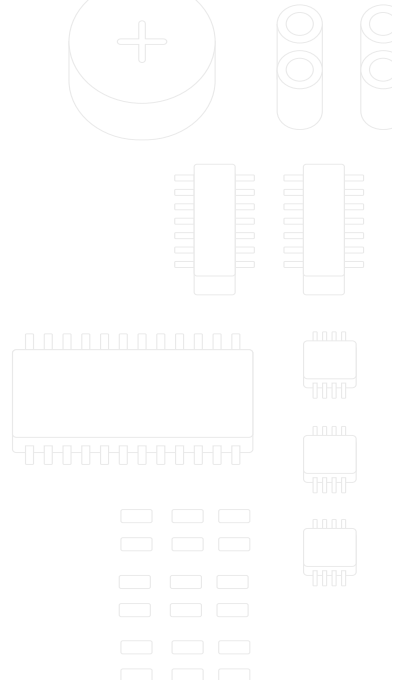
- LuCI

- LuCI 2

- Gargoyle

# Rolling your own Web UI

- Product differentiator
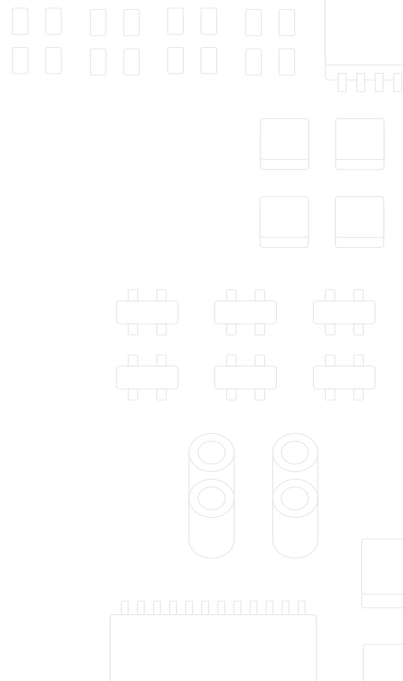
- UI/UX design

- Implementation

- Integration

# Product differentiator

- Define who will use the router

- Define how often the router will be used
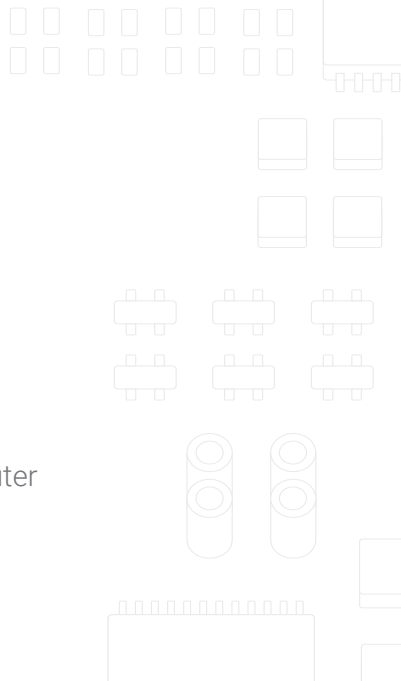
- Define special HW or SW features

# Web UI/UX design

- Design based on target audience

- Importance of an experienced UX team

# Implementation - Back end

- Three utilities of interest in OpenWrt ecosystem

  - ubus
  - UCI
  - rpcd

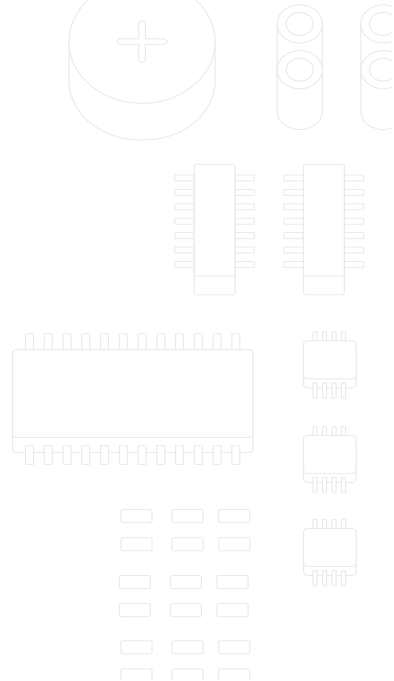- Front end invoking different RPC calls to change router behavior

# Implementation - Back end

- Accessing and modifying UCI files – straightforward
- Additional functionallities – additional rpcd modules
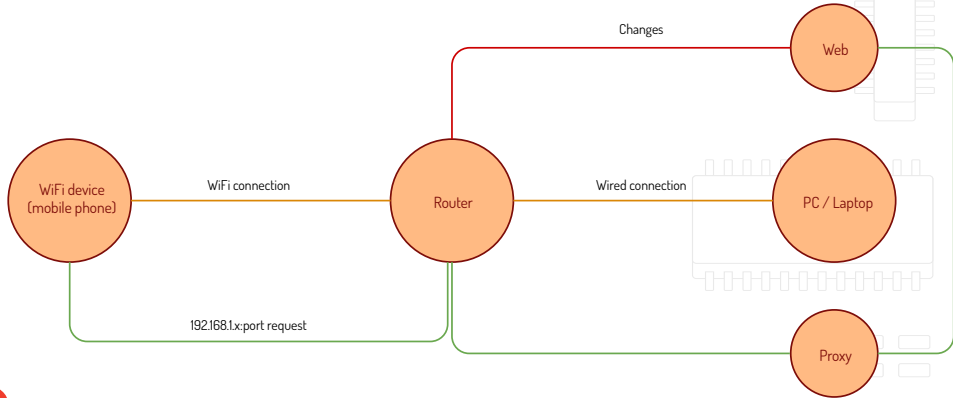  - Using existing OpenWrt packages
  - Implementing your own
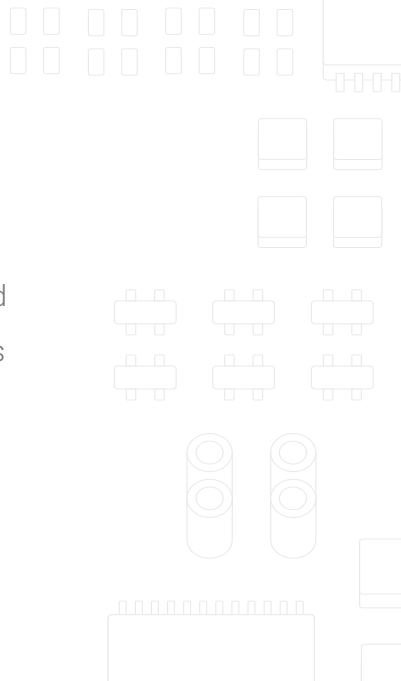
# Implementation - Front end

- Two development approaches:
  - Directly from host PC
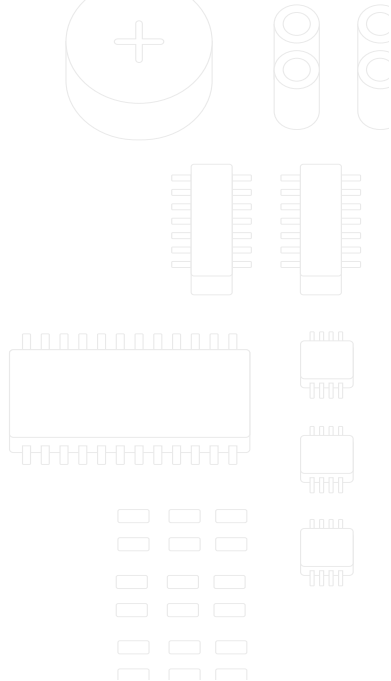  - From host PC through proxy on host PC

# Implementation - Front end



WiFi device (mobile phone) — WiFi connection — Router — Wired connection — PC / Laptop

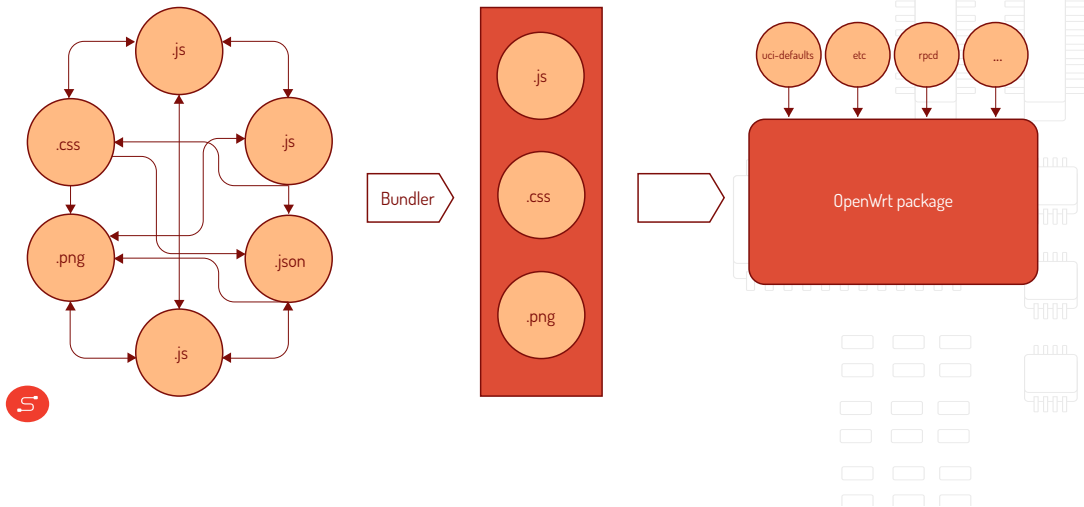Changes — Web

192.168.1.x:port request

Proxy

# Implementation - Front end

- Development components:
  - Bundler
  - JS Framework
  - HTML + CSS
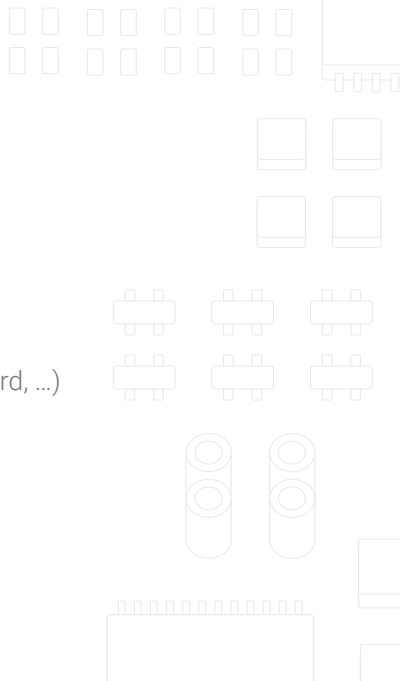
- Example:
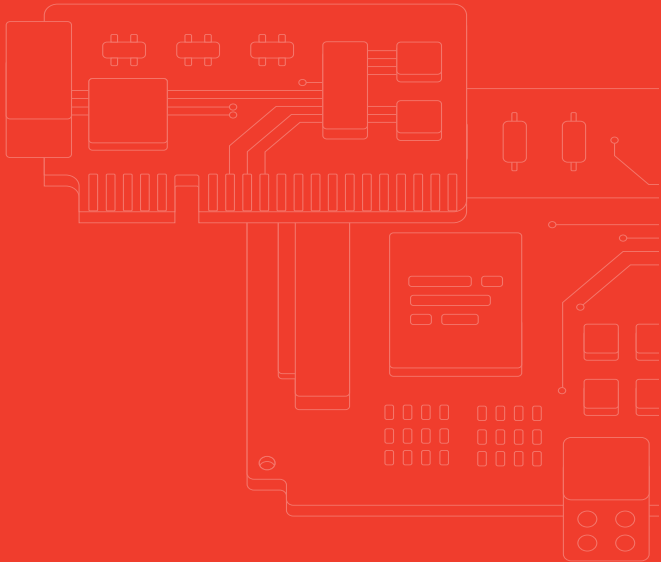  - Webpack + Vue.js + HTML & CSS preprocesors

# Integration

# Integration

○ Potential hickups:

- Timeouts
- Adding additional functionality (Captive Portal, Wizard, …)
- Security considerations (e.g. cgi-bin)
- 3rd party software bugs

# Examples

Some Web UI design & functionality examples

DASHBOARD

INTERNET SECURITY

WIRELESS SETTINGS

ADMINISTRATION

ADVANCED SETTINGS ˅

SIMPLE DASHBOARD

**ACTIVITY** OVERVIEW

TOTAL **MONTH** WEEK DAY

**1**
BLOCKED MALWARE THIS MONTH
(0 last month)

[ SECURITY LOG ]

**62**
FILES SCANNED THIS MONTH
(0 last month)

**Enabled**
Sentinel File Validation is enabled and your incoming files are being validated for malicious software

SCANNED FILES



BLOCKED MALWARE

You are connected to Optima telekom with 2.3GBps speed.

ADVANCED INTERFACE

MIYAGI

## Login

Username

Password

Remember me

Login

Dashboard
Devices
Wall Garden
Users
WIFI Areas
Groups
Policies
Log

Status
Graphs
WIFI
Configuration
**Firewall**
Network Interfaces
DHCP
DNS

General    Traffic rules    Port forwards    Custom rules    Zones

## General firewall settings

Enable SYN-flood protection    ?

Drop invalid packets    ?

**Input**

| Accept | Drop | Reject |

**Output**

| Accept | Drop | Reject |

**Forward**

| Accept | Drop | Reject |

**Backward**

| Accept | Drop | Reject |

Save and apply    Reject changes

# portal

Status

Wireless Configuration

**WAN IP**

LAN IP

Dynamic DNS

Firewall/Port Forwarding

Static routing

Storage

Admin Password

Update

Parental Control

TimeZone/DST

Support

Logout

Language ▾

## Wide Area Network IP

**Connection Accessibility** | Domain Name Server Address

**Get Dynamic IP Address**

IP Address | 192.168.10.118

Netmask | 255.255.255.0

Gateway | gatewayPh

My internet connection requires username and password

Username

Password

Service Name

Apply

# portal

- Status
- Wireless Configuration
- WAN IP
- LAN IP
- Dynamic DNS
- Firewall/Port Forwarding
- Static routing
- **VPN**
- Storage
- Admin Password
- Update
- Parental Control
- TimeZone/DST
- Support

- Logout
- Language ▾

## VPN

### Client

**No users.**
**New Client (PPTP)**

Name

Username

Password

Server

Cancel   Apply

Restart Router   Log out

# Dashboard

Dashboard
Device List
Prioritization
Speed Test
Wi-Fi Settings
Router Administration
Advanced Settings

**WRT32X**

## Network Traffic
● Connected to Internet

**192** ▼
Download Mb/s

**52** ▲
Upload Mb/s

## Devices

**23**
Connected Devices

Ⓚ **2** Killer™ Enabled Devices   ↑ **3** Prioritized Devices

## Speed Test
↻ Run Speed Test

Last run 12/11/17 11:07am

**206** ▼ Mb/s Download

**56** ▲ Mb/s Upload

**3** ● ms Ping

## Wi-Fi Network

📶 **Venom Wi-Fi**
2.4 GHz & 5 GHz

## Network Storage

Shared Drive 1
689 MB Used                    2.1 GB Available

Shared Drive 2
982 MB Used                    1.7 GB Available
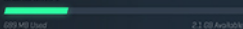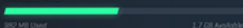
## Port Forwarding
Add/Edit Rules

| Description | Port Start | Port End | Protocol | Enabled |
|---|---|---|---|---|
| ● Minecraft | 5400 | 5400 | Both | ☑ |
| ● Overwatch | 5400 | 5400 | Both | ☑ |

## VPN Client

# Device Prioritization

We are prioritizing your devices based on a speed of 103 mbps.

## Killer Enabled Devices

The Killer Prioritization Engine ensures low latency and less lag for all Killer enabled devices on Wi-Fi. For more, visit http://www.killernetworking.com

Alex's Killer Device Rig
MyHomeNetwork

David's Killer Device Longe...
MyHomeNetwork

Dad's Gaming Device
MyHomeNetwork

Alex's

Automatically prioritizes Killer enabled device traffic

## Manual Prioritization

Drag or use the arrows on the device tiles to change the priority tier for your own Killer-enabled devices.

Family Streaming Device
MyHomeNetwork

Alex's iPad Device
MyHomeNetwork

Mom's Computer
MyHomeNetwork

Dad's Desktop Computer
MyHomeNetwork

Billy's phone
MyHomeNetwork

Jenny's phone
MyHomeNetwork

Jenny's Tablet
MyHomeNetwork

Alex's Smart Hub
MyHomeNetwork

Dane's Smart Phone
MyHomeNetwork

Dane's Laptop
MyHomeNetwork

Dad's Laptop
MyHomeNetwork

---

## WRT32X

Dashboard
Device List
Prioritization
Speed Test
Wi-Fi Settings
Router Administration
Advanced Settings

Restart Router    Log out

---

# Devices

See what devices are connected to your router and how they are connected (wired or wireless). Use this screen to personalize device names.

| Device Name | IP Address | Priority |
|---|---|---|
| My Desktop Computer<br>Ethernet Connection | 192.168.1.1 | |
| Dad's Home Laptop<br>MyHomeNetwork 5GHz | 192.168.1.1 | ↑ |
| My Gaming Laptop<br>MyHomeNetwork 2.4 GHz | 192.168.1.1 | ↑ |
| David's Game Console<br>MyHomeNetwork 2.4 GHz | 192.168.1.1 | ● |
| David's Laptop<br>MyHomeNetwork 2.4 GHz | 192.168.1.1 | ● |
| Johns iPhone 7<br>MyHomeNetwork 5GHz | 192.168.1.1 | ↓ |
| My Desktop Computer in livi...<br>MyHomeNetwork 5GHz | 192.168.1.1 | ↓ |

## WRT32X

Dashboard
Device List
Prioritization
Speed Test
Wi-Fi Settings
Router Administration
Advanced Settings

# Integration of custom Web UIs into OpenWrt

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