

ITRI WAVE/DSRC  
Communication Unit  
(IWCU)

# **IWCU User Guide**

**V4.10**

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# 1 Introduction

- **SSH login**

IP Address: 192.168.10.30

User Account: root

Password: password

- **Web Server Authentication**

Interface: http://192.168.10.30

User Account: admin

Password: iwcu2009

- **Abbreviation**

- CCH      Control Channel
- DSRC    Dedicated Short Range Communication
- IP        Internet Protocol
- IPv4     Internet Protocol Version 4
- IPv6     Internet Protocol Version 6
- IWCU    ITRI WAVE/DSRC Communication Unit
- PSC      Provider Service Context
- PSID    Provider Service Identifier
- SCH      Service Channel
- UDP      User Datagram Protocol
- WAVE    Wireless Access in Vehicular Environments
- WCU      WAVE/DSRC Communication Unit
- WSMP    WAVE Short Message Protocol
- WSA      WAVE Service Advertisements
- WME      WAVE Management Entity

## 2 Configuration

### 2.1 Initial Network Configuration

Network interfaces are configured initially as follows:

- br0 (ethernet) interface up
  - IPv4 address: 192.168.10.30
  - Mask : 255.255.255.0
  
- wave0 interface up
  - Channel number: 178 (5890 MHz)
  - IPv4 address: 192.168.2.30
  - Mask : 255.255.255.0
  
- wave1 interface up
  - Channel number: 0
  - IPv4 address: 192.168.3.30
  - Mask : 255.255.255.0

### 2.2 Cmd Interface

#### 2.2.1 Network Configuration

User can place your own startup commands in **/etc/config/startup.sh** to set network configuration or continue run your programs in the background and the first line of your own startup.sh must be “**sh /usr/local/startup.sh**”. You should pay attention to “System will come to a halt owing to the failure to do this”.

##### 2.2.1.1 Ethernet Configuration Setting

User can use the command **dsrsrc-ifset** to set the Ethernet/Wireless device's IP address and netmask.

**dsrsrc-ifset <device> <IP> up|down**

**dsrc-ifset** <device> <IP> **up netmask** <mask>

<device> - Device name (br0/wave0/wave1)

<IP> - IPv4 format

<mask> - Network mask

For example:

```
[root@herakles /root]#dsrc-ifset br0 192.168.1.1 up netmask 255.255.255.0
```

### 2.2.1.2 Channel Status

The channel status can be retrieved by using the command **dsrc-ch**.

For example:

```
[root@herakles /root]# dsrc-ch  
Wave0 channel = 178  
Wave1 channel = 0
```

## 2.2.2 WME Services and WSMP/UDP Converter

WME system provides wsmp service as well as provider service and user service. In registering one of WME service, users have to set the related parameters of WSMP/UDP converter. The WSMP/UDP converter converts an UDP packet to a WSMP packet and converts a WSMP packet to an UDP packet according to the configuration of converter rules.

### 2.2.2.1 WSA Repeat Setting

**dsrc-wsarepeat** [<repeat>]

<repeat> - WSA repeat time per 5 seconds

- Set WSA repeat time (5 seconds)

**dsrc-wsarepeat** <repeat>

- Show WSA repeat time (5 seconds)

### **dsrc-wsarepeat**

For example:

```
[root@herakles /root]# dsrc-wsarepeat
WSA repeat: 0 time per 5 seconds
[root@herakles /root]#
[root@herakles /root]# dsrc-wsarepeat 3
WSA repeat: 3 times per 5 seconds
[root@herakles /root]# dsrc-wsarepeat
WSA repeat: 3 times per 5 seconds
[root@herakles /root]#
```

## 2.2.2.2 Service and Converter Setting

- Register a WME service and add its converter rule

**dsrc-cvt -s <service name>**      WME service

1 (Provider service) | 2 (User service) | 3 (WSMP service)

**-p <psid>**      Provider Service Identifier

**-w <iwcu port>**      IWCU port number

**-u <pc port>**      PC port number

**-i <pc ip>**      PC IP address (IPv4)

**-c <channel>**      Channel number:

172(SCH) | 174(SCH) | 176(SCH) | 178(CCH) | 180(SCH) |  
182(SCH) | 184(SCH)

**-m <psc>**      Provider Service Context

### Provider service:

**dsrc-cvt -s 1 -p <psid> -w <wave-box port> -u <udp port> -i <udp ip> -c <channel> -m**

<psc>

User service:

**dsrc-cvt -s 2 -p <psid> -w <iwcu port> -u <pc port> -i <pc ip> -m <psc>**

WSMP service:

**dsrc-cvt -s 3 -p <psid> -w <iwcu port> -u <pc port> -i <pc ip>**

- List all registered WME services and their converter rules

**dsrc-cvt -q**

- Unregister a WME service and delete its converter rule

**dsrc-cvt -d <service index>**

- Unregister all registered WME services and delete their converter rules

**dsrc-cvt -d 0**

For example: (Register services and add related converters)

```
[root@herakles /root]# dsrc-cvt -s 1 -p 123 -w 52001 -u 55551 -i 192.168.10.1 -c 172 -m dsrc
Register a provider service
Register result = Success
[root@herakles /root] # dsrc-cvt -s 2 -p 124 -w 52002 -u 55552 -i 192.168.10.1 -m dsrc-user
Register a user service
Register result = Success
[root@herakles /root] # dsrc-cvt -s 3 -p 125 -w 52003 -u 55553 -i 192.168.10.1
Register a wsmp service
Register result = Success

[root@herakles config]#
```

For example: (Query all registered services and their converters)

```
[root@herakles /root] # dsrc-cvt -q
```

Query all services

| Index | Service  | Channel | PSID | IWCU port | PC port | PC IP        | PSC       | STATUS  |
|-------|----------|---------|------|-----------|---------|--------------|-----------|---------|
| 1     | Provider | 172     | 123  | 52001     | 55551   | 192.168.10.1 | dsrc      | ACTIVE  |
| 2     | User     | 0       | 124  | 52002     | 55552   | 192.168.10.1 | dsrc-user | PENDING |
| 3     | WSMP     | 178     | 125  | 52003     | 55553   | 192.168.10.1 |           | ACTIVE  |

```
[root@herakles /root]#
```

For example: (Unregister a wsmp service)

```
[root@herakles /root] # dsrc-cvt -d 3
```

Unregister a service

Unregister result = Success

```
[root@herakles /root]# wme -q
```

Query service:

| Index | Service  | Channel | PSID | IWCU port | PC port | PC IP        | PSC       | STATUS  |
|-------|----------|---------|------|-----------|---------|--------------|-----------|---------|
| 1     | Provider | 172     | 123  | 52001     | 55551   | 192.168.10.1 | dsrc      | ACTIVE  |
| 2     | User     | 0       | 124  | 52002     | 55552   | 192.168.10.1 | dsrc-user | PENDING |

```
[root@herakles /root]#
```

### 2.2.3 System Log

- Log levels

level 0 : Logging is turned off.

level 1 : A more detailed trace that includes all the transmission errors is needed to debug problems. These messages are system critical errors that should not happen normally. This level is mainly used for debugging purposes.

level 2 : A most detailed trace that includes all forwarded messages of UDP packets and WSMP packets is needed to debug the status of ethernet and wireless.

User can use log command to set and show the log level.

**dsrc-log level** [*<level>*] : set log level

*<level>* : 0 | 1 | 2

**dsrc-log level:** show the log level

For example:

```
[root@herakles /root]# dsrc-log level
0
[root@herakles /root]# dsrc-log level 2
[root@herakles /root]# dsrc-log level
2
```

- Show logged message

**dsrc-log msg** [*<line>*]

*<line>* : Print last *N* lines instead of last 10.

For example: (log level = 2)

```
[root@herakles /root]# dsrc-log msg 6
Aug 25 21:25:18 [ServMgrDaemon]: eth0: Receive udp (1024 bytes) from 192.168.10.10/55555
Aug 25 21:25:18 [ServMgrDaemon]: wave0: Send wsmg (1024 bytes) to psid 123
Aug 25 21:25:19 [ServMgrDaemon]: eth0: Receive udp (1024 bytes) from 192.168.10.10/55555
Aug 25 21:25:19 [ServMgrDaemon]: wave0: Send wsmg (1024 bytes) to psid 123
Aug 25 21:25:19 [ServMgrDaemon]: eth0: Receive udp (1024 bytes) from 192.168.10.10/55555
Aug 25 21:25:19 [ServMgrDaemon]: wave0: Send wsmg (1024 bytes) to psid 123
[root@herakles /root]#
```

- **eth0: Receive udp from 192.168.10.10/55555**

The device eth0 receives an UDP packet from IP:192.168.10.10/PORT:55555 and the UDP packet size is 1024 bytes.

- **wave0: Send wsmg (1024 bytes) to psid 123**

The device wave0 successfully sends a WSMP packet (PSID: 123) and the WSMP packet size is 1024 bytes.

## 2.2.4 User Account and Password

The command **dsrc-webset** can modify the account and password for the web service authentication.

The account and password can also be used for SSH login.

- Changing account of system and web server: **dsrc-webset account**
- Changing password of system and web server: **dsrc-webset password**

For example: (Changing account)

```
[root@herakles /root]# dsrc-webset account
New account:admin
```

```
Retype account:admin  
New account is changed successfully: admin
```

For example: (Changing password)

```
[root@herakles /root]# dsrc-webset password  
acconut: admin  
New password:  
Retype password:  
New password is changed successfully
```

## 2.2.5 Recover Initial Configuration

User can recover default configuration of system by the command: **dsrc-recover**.

## 2.3 Web Interface

- Web Server Authentication:

Interface: <http://IWCU IP> (For example: <http://192.168.10.30>)

Account: admin

Password: iwc2009

### 2.3.1 Upgrade Firmware

IWCU 1.0/2.0/3.0 firmware upgrading page is as the follows. Use “browse” button to select a new firmware, than press the “Upload” button to upgrade.



## ITRI WAVE/DSRC Communication Unit

- FIRMWARE
- NETWORK
- SERVICE
- LOG
- SYSTEM

**Firmware**

| Firmware | Uploaded                              | Main                                    | Backup                                  |
|----------|---------------------------------------|-----------------------------------------|-----------------------------------------|
| Version  | N/A                                   | ITRI                                    | ITRI-WAVE17-v15                         |
| Length   |                                       | 4866048                                 | 4296704                                 |
| Checksum |                                       | b7d775fc                                | e00f430b                                |
|          | <input type="button" value="Upload"/> | <input type="button" value="Download"/> | <input type="button" value="Download"/> |

Automatically backup after main firmware upgraded

☐ Enable ☒ Disable

Main to Backup (Backup main firmware)

Backup to Main (Recover backup firmware)

Uploaded to Main (Upgrade the uploaded firmware)

IWCU 4.0 firmware upgrading page is as the follows. Use “browse” button to select a new firmware, than press the “Upload” button to upgrade.



## ITRI WAVE/DSRC Communication Unit

- FIRMWARE
- NETWORK
- SERVICE
- LOG
- SYSTEM

### Firmware Version / Build Date

Version : MIPS.1.09schoolIntellus.itri

Build Date : Mon, 19 Mar 2012 11:30:10 +0800

### Firmware Update

Firmware Upload:

(Select A Local Firmware File)

## 2.3.2 Network Configuration



# ITRI WAVE/DSRC Communication Unit

FIRMWARE

NETWORK

SERVICE

LOG

SYSTEM

### Ethernet Configuration

Eth : ☒ up ☐ down

MAC : 00:22:c3:00:03:ef

IPv4 :

Mask :

Gateway :

Apply

### Wave0 Configuration

Wave0 : ☒ up ☐ down

MAC : 00:22:c3:00:03:ef

IPv4 :

Mask :

Channel : 178

Apply

### Wave1 Configuration

Wave1 : ☒ up ☐ down

MAC : 00:19:70:2a:04:74

IPv4 :

Mask :

Channel : 0

Apply

### 2.3.2.1 Network Configuration Setting

- Network Configuration

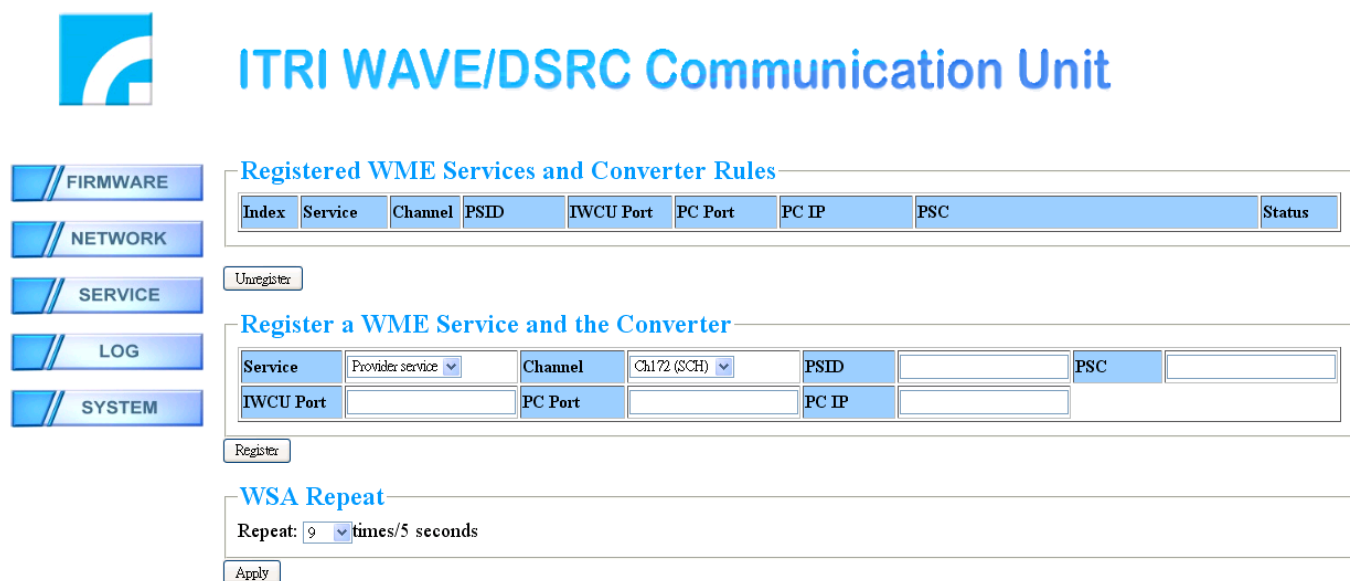
By selecting the device ‘up’ and pushing the “Apply” button the IP address and mask of the network device will be modified. The user also can choose the device ‘down’ to close it.

### 2.3.2.2 Channel Status

- Wave0 and Wave1 Channel Status

The field ‘Channel’ shows the current channel frequency of wireless devices.

### 2.3.3 WME Services and WSMP/UDP Converter



The screenshot displays the ITRI WAVE/DSRC Communication Unit web interface. On the left is a navigation menu with buttons for FIRMWARE, NETWORK, SERVICE (selected), LOG, and SYSTEM. The main content area is titled 'Registered WME Services and Converter Rules' and contains a table with columns: Index, Service, Channel, PSID, IWCU Port, PC Port, PC IP, PSC, and Status. Below the table is an 'Unregister' button. A section titled 'Register a WME Service and the Converter' contains a form with fields for Service (dropdown), Channel (dropdown), PSID, IWCU Port, PC Port, PC IP, and PSC. Below this form is a 'Register' button. At the bottom, there is a 'WSA Repeat' section with a 'Repeat' dropdown set to 9 and the text 'times/5 seconds', followed by an 'Apply' button.

#### 2.3.3.1 Service and Converter Setting

- Register a WME Service and the Converter

User can push down the “Register” button to register a WME Service and add its converter rule according to the input values of Service, Channel, PSID, IWCU Port, PC Port, PC IP and PSC.

- Service

It includes Provider service, User service and WSMP service.

- Channel

WSMP service can only select the channel 178.

- PSID

It must be a positive integer and smaller than  $2^{32}$ . The range is defined in IEEE 1609.3. The valid value: 0 ~ 127, 32768 ~ 49151, 12582912 ~ 14680063, 3758096384 ~ 4026531839.

- IWCU Port & PC Port

It must be a positive integer and smaller than 65535.

- PSC

PSC means provider service context and it is null for WSMP service.

- Registered WME Services and the Converters

All of registered WME Services and its converter rules will be shown in the section “Registered WME Services and the Converters”. The field “Status” will show “ACTIVE” when getting the channel resource. On the contrary, it will show “PENDING”.

- Unregister a WME Service & Unregister all registered WME services

By pressing the “Unregister” button user can unregister a WME Service and remove its converter rule. It is convenient to unregister all registered WME services and remove their converter rules once by pushing down the “Unregister All” button.



## ITRI WAVE/DSRC Communication Unit

FIRMWARE

NETWORK

SERVICE

LOG

SYSTEM

### Registered WME Services and Converter Rules

| Index | Service  | Channel | PSID | IWCU Port | PC Port | PC IP         | PSC  | Status  |                             |
|-------|----------|---------|------|-----------|---------|---------------|------|---------|-----------------------------|
| 1     | Provider | 172     | 111  | 11        | 11      | 192.168.10.10 | ITRI | Active  | <button>Unregister</button> |
| 2     | User     | 174     | 112  | 33        | 33      | 192.168.10.10 | USER | Pending | <button>Unregister</button> |
| 3     | WSMP     | 178     | 113  | 44        | 44      | 192.168.10.10 |      | Active  | <button>Unregister</button> |

Unregister

### Register a WME Service and the Converter

|           |                    |         |               |       |  |     |  |
|-----------|--------------------|---------|---------------|-------|--|-----|--|
| Service   | Provider service ▼ | Channel | Ch172 (SCH) ▼ | PSID  |  | PSC |  |
| IWCU Port |                    | PC Port |               | PC IP |  |     |  |

Register

### WSA Repeat

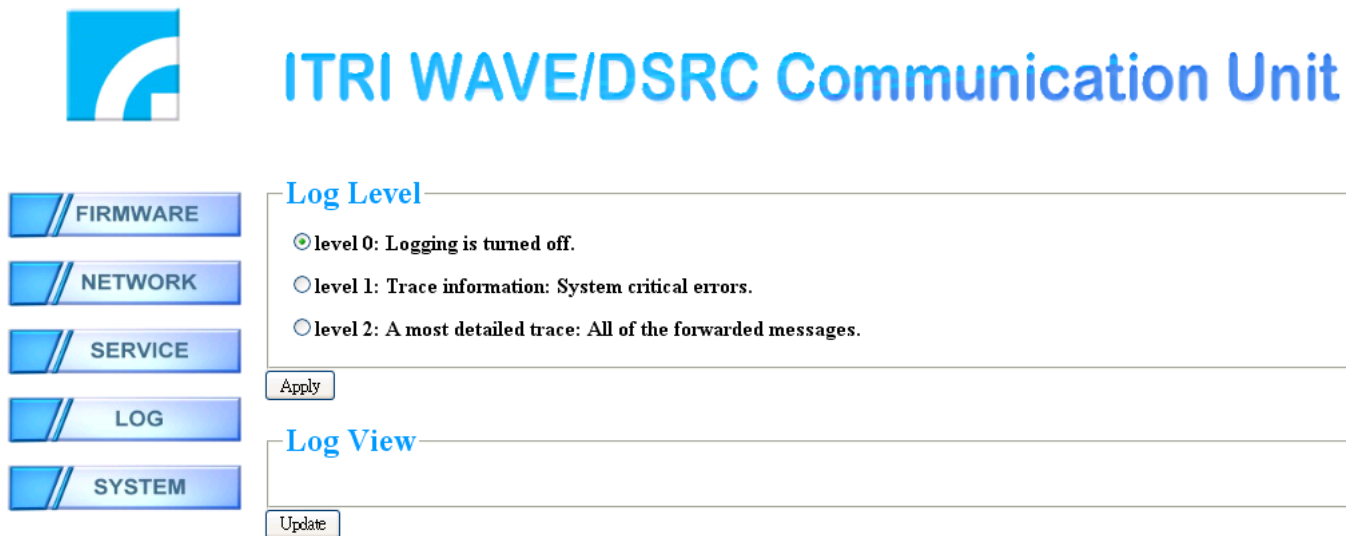
Repeat: 9 ▼ times/5 seconds

Apply

### 2.3.3.2 WSA Repeat Setting

User can select a repeat time among 0~255 to set WSA repeat by pressing the “Apply” button.

### 2.3.4 System Log



**ITRI WAVE/DSRC Communication Unit**

**Log Level**

☒ level 0: Logging is turned off.

☐ level 1: Trace information: System critical errors.

☐ level 2: A most detailed trace: All of the forwarded messages.

Apply

**Log View**

Update

Log level includes level 0, level 1 and level 2. Level 0 means logging is turn off. In level 1 a more detailed trace that includes all the transmission errors is needed to debug problems. These messages are system critical errors that should not happen normally. This level is mainly used for debugging purposes. In level 2 a most detailed trace that includes all forwarded messages of UDP packets and WSMP packets is needed to debug the status of ethernet and wireless. To set log level user must select a level and press the “Apply” button. The log messages will be shown in the section “Log View” and keep the up-to-date information by pressing the “Update” button.



## ITRI WAVE/DSRC Communication Unit

**FIRMWARE****NETWORK****SERVICE****LOG****SYSTEM**

### Log Level

- ☐ level 0: Logging is turned off.
- ☐ level 1: Trace information: System critical errors.
- ☒ level 2: A most detailed trace: All of the forwarded messages.

### Log View

Dec 26 10:05:52 [ServMgrDaemon]: Service index 1 changed to ACTIVE

### 2.3.5 User Account and Password

By pressing the “Apply” button user can change the account and password. User should pay attention to the account and password of system will also be modified.



## ITRI WAVE/DSRC Communication Unit

**FIRMWARE****NETWORK****SERVICE****LOG****SYSTEM**

### Account / Password

Account :

Password :

### Recover

Recover default configuration.

### Reboot

Restart the system.

### 2.3.6 Recover and Reboot

User can push down the “Recover” button to recover the system.



## ITRI WAVE/DSRC Communication Unit

// FIRMWARE

**Default configuration has been recovered...**

// NETWORK

// SERVICE

**You have to login again.**

// LOG

// SYSTEM

User can push down the “Reboot” button to reboot the system.



## ITRI WAVE/DSRC Communication Unit

// FIRMWARE

**Rebooting the system...**

// NETWORK

// SERVICE

**You have to login again.**

// LOG

// SYSTEM

**IMPORTANT NOTE: FCC Radiation Exposure Statement:**

**This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body. This transmitter must not be co- located or operating in conjunction with any other antenna or transmitter. The availability of some specific channels and/or operational frequency bands are country dependent and are firmware programmed at the factory to match the intended destination. The firmware setting is not accessible by the end user.**

**Wireless 5 GHz Band Statements:**

**This module could only been operated at 5850- 5925 MHz frequency band.**

**This device complies with Part 15 of the FCC Rules.**

**Operation is subject to the following two onditions:**

- (1) this device may not cause harmful interference, and**
- (2) this device must accept any interference received, including interference that may cause undesired operation.**