

# 车载无线解决方案典型配置举例

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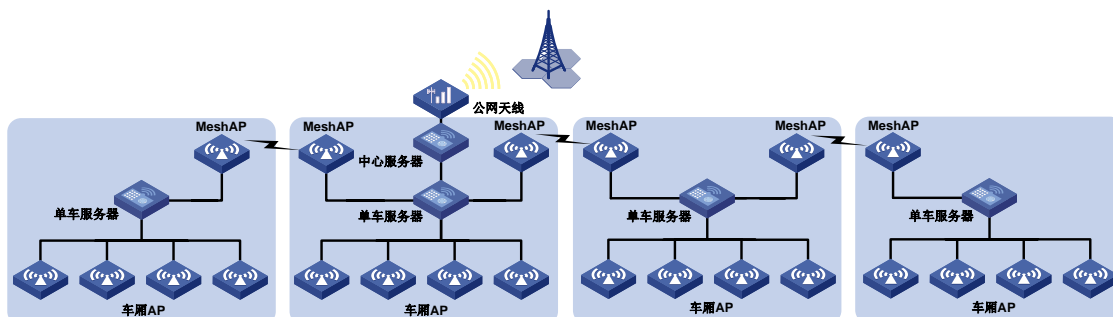
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# 1 简介

## 1.1 方案组网：

- 列车中心车厢部署一台中心服务器 LA6616-X3 及一台单车服务器 LA6608-X1，通过 M12 有线口相连，其他每节车厢各部署一台单车服务器 LA6608-X1。
- 每节车厢的单车服务器下挂 4 台车厢 AP（WA4320-TI）和两台 Mesh AP（WA4310-TB），相邻车厢的单车服务器之间通过 Mesh AP 连接，如[图 1-1](#)所示连接。

图1-1 车载无线 LA6600 方案典型组网图



## 1.2 方案描述：

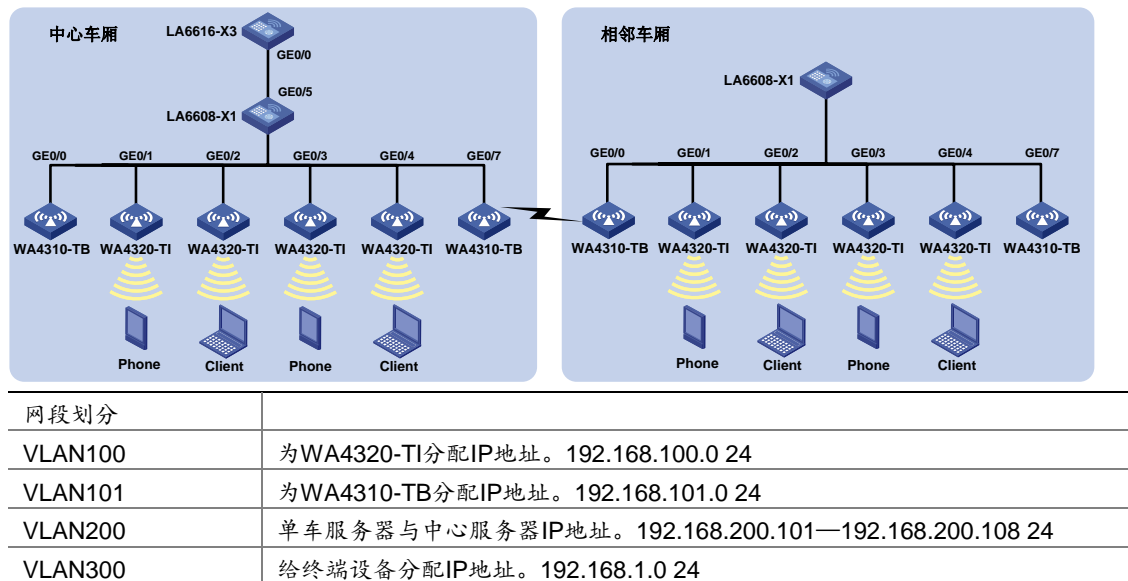
- 中心服务器作为所有单车服务器的网关，负责转发各单车服务器访问外网的流量，内置 3 家运营商 9 张 SIM 卡，通过 LTE 网络接入互联网，并支持链路负载均衡。
- 单车服务器内嵌无线控制器，作为 AC 设备管理连接至本机的 AP 设备，承担所有手机终端的网关功能，转发手机终端发送至外网的流量。同时单车服务器支持 PoE，负责为本车厢内 AP 供电。
- 车厢 AP 提供 2.4GHz 和 5.8GHz 双频接入，通过合理的频点规划使相邻的 AP 工作于不同的无线频点以提升用户接入密度。
- 车厢间单车服务器通过 Mesh AP 实现相互连接，建议采用 5.1GHz 频段，并做频点隔离，例如 1,2 车厢相接的无线 AP 和 2,3 车厢相接的无线网桥采用不同的 5.1GHz 的频点，避免相互干扰。

# 2 车载无线典型配置

## 2.1 组网需求

如[图 2-1](#)所示，LA6616-X3 与本节车厢中的 LA6608-X1 有线连接，相邻 LA6608-X1 之间通过 WA4310-TB 相连接，每台 LA6608-X1 下挂四个 WA4320-TI。

图2-1 车载服务器 LA6616、LA6608-X1， LA6608-X2 与 AP 相结合的典型配置组网图



## 2.2 配置思路

中心服务器 LA6616-X3:

- 为了使车厢内各个终端设备，最终能够通过中心服务器连入互联网，首先需要在中心服务器上配置上网功能及负载均衡。
- 中心服务器作为所有单车服务器的网关，管理各个车厢的单车服务器。

单车服务器 LA6608-X1:

- 为了使车厢内各个终端设备，最终能够通过中心服务器连入互联网，还需要在单车服务器上配置上网功能。
- 单车服务器作为所有终端设备的网关，管理所有终端设备。
- 单车服务器作为 AC 管理接入的 AP 设备。
- 相邻车厢的单车服务器之间通过 WLAN-Mesh 相连通。

接口	接口类型	允许通过的VLAN	缺省VLAN
GE0/0&GE0/7	Trunk	VLAN101&VLAN200	VLAN101
GE0/1~GE0/4	Trunk	VLAN100&VLAN300	VLAN100
GE0/5	Access	VLAN200	VLAN1

## 2.3 配置注意事项

- 仅中心车厢的单车服务器通过 GE0/5 端口与中心服务器 GE0/0 端口有线相连，且需要进行端口配置，其余车厢的单车服务器均不需要对该端口进行配置。
- 中心服务器含有多个 4G 模块对应各运营商 sim 卡槽位，本举例中仅以移动 1 卡槽 (cellular1/0) 为例，实际应用中通过插入多张 SIM 卡，同时配置多条静态路由实现负载均衡。
- 中心服务器内联口 GE0/4、GE0/5 不支持切换二层模式。

## 2.4 配置步骤

### 2.4.1 中心服务器配置

#### 1. 配置中心服务器 4G 上网功能

# 配置拨号访问组 1 以及对应的拨号访问控制条件。

```
<LA6616> system-view
```

```
[LA6616] dialer-group 1 rule ip permit
```

# 将 Cellular 接口通道化出以太网通道接口。

```
[LA6616] controller Cellular 1/0
```

```
[LA6616-Cellular1/0] eth-channel 0
```

```
[LA6616-Cellular1/0] quit
```

# 配置以太网通道接口的 IP 地址。

```
[LA6616] interface Eth-channel 1/0:0
```

```
[LA6616-Eth-channel1/0:0] ip address cellular-alloc
```

# 在接口上使能传统 DDR。

```
[LA6616-Eth-channel1/0:0] dialer circular enable
```

# 将接口加入拨号访问组 1。

```
[LA6616-Eth-channel1/0:0] dialer-group 1
```

# 配置 DDR 可以进行下一次呼叫的间隔时间为 5 秒。

```
[LA6616-Eth-channel1/0:0] dialer timer autodial 5
```

# 配置接口去往对端的拨号串（移动和联通均为\*99#，电信为#777）。

```
[LA6616-Eth-channel1/0:0] dialer number *99# autodial
```

# 配置接口出方向 nat 转换。

```
[LA6616-Eth-channel1/0:0] nat outbound
```

```
[LA6616-Eth-channel1/0:0] quit
```

# 将移动一槽位插入移动可用 sim 卡，重启猫。

```
[LA6616] controller Cellular 1/0
```

```
[LA6616-Cellular1/0] modem reboot
```

```
[LA6616-Cellular1/0] quit
```

# 配置中心服务器缺省路由。

```
[LA6616] ip route-static 0.0.0.0 0 Eth-channel1/0:0
```

# 开启 dns 代理功能。

```
[LA6616] dns proxy enable
```

```
[LA6616] quit
```

#### 2. 配置中心服务器 DHCP 功能

# 配置中心服务器 GE0/0 接口 IP 地址。

```
<LA6616> system-view
```

```
[LA6616] interface GigabitEthernet 0/0
```

```
[LA6616-GigabitEthernet0/0] port link-mode route
```

```
[LA6616-GigabitEthernet0/0] ip address 192.168.200.1 24
```

```
[LA6616-GigabitEthernet0/0] quit
```

# 开启 DHCP 服务。

```
[LA6616] dhcp enable
```

# 配置 DHCP 地址池 200，为单车服务器分配 192.168.200.0/24 网段地址。

```
[LA6616] dhcp server ip-pool 200
[LA6616-dhcp-pool-200] network 192.168.200.0 24
[LA6616-dhcp-pool-200] gateway-list 192.168.200.1
[LA6616-dhcp-pool-200] dns-list 192.168.200.1
[LA6616-dhcp-pool-200] address range 192.168.200.101 192.168.200.150
[LA6616-dhcp-pool-200] quit
```

## 2.4.2 单车服务器配置

### 1. 配置单车服务器 LA6608-X1 与中心服务器 LA6616-X3 三层连通

# 在 LA6608-X1 上创建 VLAN200，将 GE0/5 接口加入 VLAN。

```
<LA6608-X1> system-view
[LA6608-X1] vlan 200
[LA6608-X1-vlan200] port GigabitEthernet 0/5
[LA6608-X1-vlan200] quit
```

# 配置 VLAN200 虚接口自动获取 IP 地址。

```
[LA6608-X1] interface Vlan-interface 200
[LA6608-X1-Vlan-interface200] ip address dhcp-alloc
```

# 配置接口出方向 nat 转换。

```
[LA6608-X1-Vlan-interface200] nat outbound
[LA6608-X1-Vlan-interface200] quit
```

# 开启 dns 代理功能。

```
[LA6608-X1] dns proxy enable
[LA6608-X1] quit
```

### 2. 配置单车服务器 LA6608-X1 为接入的车厢 AP 分配 IP 地址

# 配置 GE0/1 至 GE0/4 接口为 trunk 口，pvid 为 vlan100，允许 vlan300 通过。

```
<LA6608-X1> system-view
[LA6608-X1] interface range GigabitEthernet 0/1 to GigabitEthernet 0/4
[LA6608-X1-if-range] port link-mode bridge
[LA6608-X1-if-range] port link-type trunk
[LA6608-X1-if-range] undo port trunk permit vlan 1
[LA6608-X1-if-range] port trunk permit vlan 100 300
[LA6608-X1-if-range] port trunk pvid vlan 100
[LA6608-X1-if-range] quit
```

# 配置 VLAN100 虚接口的 IP 地址。

```
[LA6608-X1] interface Vlan-interface 100
[LA6608-X1-Vlan-interface100] ip address 192.168.100.1 24
[LA6608-X1-Vlan-interface100] quit
```

# 开启 DHCP 服务。

```
[LA6608-X1] dhcp enable
```

# 配置 DHCP 地址池 100，为接入的车厢 AP 设备分配 192.168.100.0/24 网段地址。

```
[LA6608-X1] dhcp server ip-pool 100
[LA6608-X1-dhcp-pool-100] network 192.168.100.0 mask 255.255.255.0
[LA6608-X1-dhcp-pool-100] option 43 hex 8007000001c0a86401
```

```
[LA6608-X1-dhcp-pool-100] quit
```

# 配置 GE0/1 至 GE0/4 接口使能 PoE 功能。

```
[LA6608-X1] interface range GigabitEthernet 0/1 to GigabitEthernet 0/4
```

```
[LA6608-X1-if-range] poe enable
```

```
[LA6608-X1-if-range] quit
```

### 3. 配置单车服务器 LA6608-X1 的 AC 功能

# 配置 AC 自动发现 AP 设备。

```
<LA6608-X1> system-view
```

```
[LA6608-X1] wlan auto-ap enable
```

```
[LA6608-X1] wlan auto-persistent enable
```

# 配置 AC 不检测 AP 版本。

```
[LA6608-X1] wlan global-configuration
```

```
[LA6608-X1-wlan-global-configuration] firmware-upgrade disable
```

```
[LA6608-X1-wlan-global-configuration] quit
```

# 创建无线服务模板，名称为 5G。

```
[LA6608-X1] wlan service-template 5G
```

```
[LA6608-X1-wlan-st-5g] ssid railway_test_5
```

```
[LA6608-X1-wlan-st-5g] vlan 300
```

# 配置 AP 转发模式为本地转发。

```
[LA6608-X1-wlan-st-5g] client forwarding-location ap
```

```
[LA6608-X1-wlan-st-5g] service-template enable
```

```
[LA6608-X1-wlan-st-5g] quit
```

# 创建无线服务模板，名称为 2G。

```
[LA6608-X1] wlan service-template 2G
```

```
[LA6608-X1-wlan-st-2g] SSID railway_test_2.4
```

```
[LA6608-X1-wlan-st-2g] vlan 300
```

```
[LA6608-X1-wlan-st-2g] client forwarding-location ap
```

```
[LA6608-X1-wlan-st-2g] service-template enable
```

```
[LA6608-X1-wlan-st-2g] quit
```

# 配置车厢 AP 组。

```
[LA6608-X1] wlan ap-group ti
```

# 将满足 IP 条件的 AP 加入该 AP 组。

```
[LA6608-X1-wlan-ap-group-ti] if-match ip 192.168.100.0 255.255.255.0
```

# 配置 AP 组型号。

```
[LA6608-X1-wlan-ap-group-ti] ap-model WA4320-TI
```

# 在 AP 组视图下开启射频功能 Radio 1。

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI] radio 1
```

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-1] radio enable
```

# 将 5G 无线服务模板绑定到 AP 组的 Radio 1 口。

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-1] service-template 5g
```

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-1] quit
```

# 在 AP 组视图下开启射频功能 Radio2。

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI] radio 2
```

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-2] radio enable
```

# 将 2G 无线服务模板绑定到 AP 组的 Radio 2 口。

```
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-2] service-template 2g
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI-radio-2] quit
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI] quit
[LA6608-X1-wlan-ap-group-ti] quit
```

#### 4. 将 AP 设备的软件版本及配置文件导入单车服务器 flash 中

# ftp 到本地存有软件版本（wa4300.ipe）及配置文件（ti.txt）的 ftp 服务器。

```
<LA6608-X1> ftp 192.168.1.77
```

# 输入用户名密码。

```
ftp> bin
```

# 导入 ap 软件版本（wa4300.ipe）文件。

```
ftp> get wa4300.ipe
```

# 导入车厢 ap 配置文件（ti.txt）。

```
ftp> get ti.txt
```

```
ftp> quit
```

# ti.txt 配置文件（主要更改接口为 trunk 口，并允许 vlan300 报文通过）。



ti.txt

# 为接入的 WA4320-TI 设备组下发 ti.txt 配置文件。

```
<LA6608-X1> system-view
[LA6608-X1] wlan ap-group ti
[LA6608-X1-wlan-ap-group-ti] ap-model WA4320-TI
[LA6608-X1-wlan-ap-group-ti-ap-model-WA4320-TI] map-configuration flash:/ti.txt
```

#### 5. 配置单车服务器管理接入终端设备，为手机分配 IP。

# 配置 VLAN300 虚接口的 ip 地址。

```
<LA6608-X1> system-view
[LA6608-X1] interface Vlan-interface 300
[LA6608-X1-Vlan-interface300] ip address 192.168.1.1 24
[LA6608-X1-Vlan-interface300] quit
```

# 配置 dhcp 地址池 300，为接入的终端设备分配 192.168.1.0/24 网段地址。

```
[LA6608-X1] dhcp server ip-pool 300
```

# 将终端的网关及 dns 服务器均指向本机 ip 地址：192.168.1.1。

```
[LA6608-X1-dhcp-pool-300] gateway-list 192.168.1.1
[LA6608-X1-dhcp-pool-300] dns-list 192.168.1.1
[LA6608-X1-dhcp-pool-300] network 192.168.1.0 24
[LA6608-X1-dhcp-pool-300] quit
[LA6608-X1] quit
```

#### 6. 配置相邻单车服务器通过 WLAN-Mesh 相连接

# 配置 GE0/0、GE0/7 接口为 trunk 口，允许 VLAN101，VLAN200 通过。

```
<LA6608-X1> system-view
[LA6608-X1] interface range GigabitEthernet 0/0 GigabitEthernet 0/7
[LA6608-X1-if-range] port link-type trunk
```



```
[LA6608-X1-if-range] undo port trunk permit vlan 1
[LA6608-X1-if-range] port trunk permit vlan 101 200
[LA6608-X1-if-range] trunk pvid vlan 101
[LA6608-X1-if-range] quit
# 配置 VLAN101 虚接口的 IP 地址。
[LA6608-X1] interface Vlan-interface 101
[LA6608-X1-Vlan-interface101] ip address 192.168.101.1 24
[LA6608-X1-Vlan-interface101] quit
# 开启 DHCP 服务。
[LA6608-X1] dhcp enable
# 配置 DHCP 地址池 101，为接入的 Mesh AP 设备分配 192.168.101.0/24 网段地址。
[LA6608-X1] dhcp server ip-pool 101
[LA6608-X1-dhcp-pool-101] network 192.168.101.0 mask 255.255.255.0
[LA6608-X1-dhcp-pool-101] option 43 hex 8007000001c0a86501
[LA6608-X1-dhcp-pool-101] quit
# 在单车服务器上创建一个编号为 1 的 Mesh-Profile。
[LA6608-X1] wlan mesh-profile 1
# 配置 Mesh ID 为 1。
[LA6608-X1-wlan-mesh-profile-1] mesh-id 1
# 配置认证模式为 SAE。
[LA6608-X1-wlan-mesh-profile-1] akm mode sae
# 配置预共享密钥为 12345678。
[LA6608-X1-wlan-mesh-profile-1] preshared-key pass-phrase simple 12345678
# 开启 Mesh Profile。
[LA6608-X1-wlan-mesh-profile-1] mesh-profile enable
[LA6608-X1-wlan-mesh-profile-1] quit
# 配置无线服务模板 service1，配置 SSID 为 mesh-network，并使能服务模板。
[LA6608-X1] wlan service-template service1
[LA6608-X1-wlan-st-service1] ssid mesh-network
[LA6608-X1-wlan-st-service1] service-template enable
[LA6608-X1-wlan-st-service1] quit
# 创建 AP 的模板，名称为 ap1，型号名称 WA4310-TB，并配置 AP 的序列号为 210235A29G007C000020。
[LA6608-X1] wlan ap ap1 model WA4310-TB
[LA6608-X1-wlan-ap-ap1] serial-id 210235A29G007C000020
# 将 Mesh Profile 1 绑定到 ap1 的 Radio 1 口。
[LA6608-X1-wlan-ap-ap1] radio 1
[LA6608-X1-wlan-ap-ap1-radio-1] mesh-profile 1
# 配置射频类型为 dot11n (5GHz)。
[LA6608-X1-wlan-ap-ap1-radio-1] type dot11an
# 配置射频工作信道为 149。
[LA6608-X1-wlan-ap-ap1-radio-1] channel 149
# 开启 Radio。
[LA6608-X1-wlan-ap-ap1-radio-1] radio enable
```

# 向 ap1 的邻居白名单中添加 ap2 的 MAC 地址，使 ap1 仅与 ap2 建立 Mesh 连接，以避免环路的产生。

```
[LA6608-X1-wlan-ap-ap1-radio-1] mesh peer-mac-address 77a2-c25d-e316
[LA6608-X1-wlan-ap-ap1-radio-1] quit
```

# 创建 WLAN-Mesh 接口。

```
[LA6608-X1-wlan-ap-ap1] interface wlan-mesh 1
```

# 将 wlan-mesh 1 绑定到 ap1 的 Radio 1 口。

```
[LA6608-X1-wlan-ap-ap1] radio 1
[LA6608-X1-wlan-ap-ap1-radio-1] mesh-interface 1
```

# 配置 WLAN-Mesh 接口的链路类型为 Trunk 类型。

```
[LA6608-X1-wlan-ap-ap1] interface wlan-mesh 1
[LA6608-X1-wlan-ap-mppl-wlan-mesh-1] mesh-port link type trunk
```

# 配置 Trunk 类型的 WLAN-Mesh 1 接口允许 VLAN 200 通过。

```
[LA6608-X1-wlan-ap-ap1-wlan-mesh-1] undo mesh-port trunk permit vlan 1
[LA6608-X1-wlan-ap-ap1-wlan-mesh-1] mesh-port trunk permit vlan 200
[LA6608-X1-wlan-ap-ap1-wlan-mesh-1] mesh-port trunk pvid vlan 200
[LA6608-X1-wlan-ap-ap1-wlan-mesh-1] quit
```

# 配置 GE0/0、GE0/7 接口使能 PoE 功能。

```
[LA6608-X1] interface range GigabitEthernet 0/0 GigabitEthernet 0/7
[LA6608-X1-if-range] poe enable
[LA6608-X1-if-range] quit
```

## 2.5 配置验证

### 1. 中心服务器 4G 上行能功能正常，可以上外网

# 观察中心服务器接口情况，移动一 4G 接口 UP，并成功获取到 IP 地址。

```
[H3C] display interface brief
Brief information on interfaces in route mode:
Link: ADM - administratively down; Stby - standby
Protocol: (s) - spoofing
Interface          Link Protocol Primary IP      Description
E-Ch1/0:0          UP   UP           10.128.85.233
GE0/0              UP   UP           --
GE0/1              DOWN DOWN        --
GE0/2              DOWN DOWN        --
GE0/3              UP   UP           --
GE0/4              UP   UP           --
GE0/5              UP   UP           --
InLoop0            UP   UP(s)        --
MGEO               UP   UP           --
NULL0              UP   UP(s)        --
REG0               UP   --           --
```

```
Brief information on interfaces in bridge mode:
Link: ADM - administratively down; Stby - standby
Speed: (a) - auto
```

```
Duplex: (a)/A - auto; H - half; F - full
Type: A - access; T - trunk; H - hybrid
Interface          Link Speed    Duplex Type PVID Description
WLAN-Radio0/0     UP    --      --    --    --
```

# 中心服务器 ping 外网网址，可以正常 ping 通。

```
[H3C] ping www.baidu.com
Ping www.baidu.com (111.13.100.91): 56 data bytes, press CTRL_C to break
56 bytes from 111.13.100.91: icmp_seq=0 ttl=55 time=59.121 ms
56 bytes from 111.13.100.91: icmp_seq=1 ttl=55 time=28.435 ms
56 bytes from 111.13.100.91: icmp_seq=2 ttl=55 time=19.625 ms
56 bytes from 111.13.100.91: icmp_seq=3 ttl=55 time=19.662 ms
56 bytes from 111.13.100.91: icmp_seq=4 ttl=55 time=24.627 ms

--- Ping statistics for www.baidu.com ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 19.625/30.294/59.121/14.788 ms
[H3C]%Sep 18 13:04:59:964 2012 H3C PING/6/PING_STATISTICS: Ping statistics for www.baidu.com:
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss, round-trip
min/avg/max/std-dev = 19.625/30.294/59.121/14.788 ms.[H3C]
```

## 2. 检测中心服务器与单车服务器联通情况

# 观察中心服务器上 dhcp 地址分配成功。

```
[H3C] dis dhcp server ip-in-use pool 200
IP address          Client identifier/   Lease expiration      Type
                   Hardware address
192.168.200.101    0038-3034-382e-6363- Sep 19 13:10:13 2012 Auto(C)
                   3631-2e61-6561-612d-
                   566c-616e-3230-30
```

# 中心服务器上可以 ping 通单车服务器。

```
[H3C] ping 192.168.200.101
Ping 192.168.200.101 (192.168.200.101): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.200.101: icmp_seq=0 ttl=255 time=0.522 ms
56 bytes from 192.168.200.101: icmp_seq=1 ttl=255 time=0.189 ms
56 bytes from 192.168.200.101: icmp_seq=2 ttl=255 time=0.161 ms
56 bytes from 192.168.200.101: icmp_seq=3 ttl=255 time=0.157 ms
56 bytes from 192.168.200.101: icmp_seq=4 ttl=255 time=0.162 ms

--- Ping statistics for 192.168.200.101 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 0.157/0.238/0.522/0.142 ms
[H3C] %Sep 18 13:11:05:674 2012 H3C PING/6/PING_STATISTICS: Ping statistics for 1
92.168.200.101: 5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss,
round-trip min/avg/max/std-dev = 0.157/0.238/0.522/0.142 ms.
```

## 3. 检查单车服务器是否成功连接外网

# 单车服务器 VLAN200 虚接口上成功获取中心服务器分配的 dhcp 地址。

```
<H3C> display dhcp client interface Vlan-interface 200
Vlan-interface200 DHCP client information:
Current state: BOUND
```

```
Allocated IP: 192.168.200.101 255.255.255.0
Allocated lease: 86400 seconds, T1: 41458 seconds, T2: 75600 seconds
DHCP server: 192.168.200.1
```

# 单车服务器可以 ping 通中心服务器。

```
<H3C>ping 192.168.200.1
Ping 192.168.200.1 (192.168.200.1): 56 data bytes, press CTRL_C to break
56 bytes from 192.168.200.1: icmp_seq=0 ttl=255 time=0.342 ms
56 bytes from 192.168.200.1: icmp_seq=1 ttl=255 time=0.165 ms
56 bytes from 192.168.200.1: icmp_seq=2 ttl=255 time=0.123 ms
56 bytes from 192.168.200.1: icmp_seq=3 ttl=255 time=0.119 ms
56 bytes from 192.168.200.1: icmp_seq=4 ttl=255 time=0.116 ms

--- Ping statistics for 192.168.200.1 ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 0.116/0.173/0.342/0.086 ms
<H3C>%Oct 10 14:49:43:853 2016 H3C PING/6/PING_STATISTICS: Ping statistics for 1
92.168.200.1: 5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss, r
ound-trip min/avg/max/std-dev = 0.116/0.173/0.342/0.086 ms.
```

# 单车服务器可以 ping 通外网。

```
<H3C>ping www.baidu.com
Ping www.baidu.com (111.13.100.91): 56 data bytes, press CTRL_C to break
56 bytes from 111.13.100.91: icmp_seq=0 ttl=54 time=68.621 ms
56 bytes from 111.13.100.91: icmp_seq=1 ttl=54 time=22.526 ms
56 bytes from 111.13.100.91: icmp_seq=2 ttl=54 time=20.663 ms
56 bytes from 111.13.100.91: icmp_seq=3 ttl=54 time=19.697 ms
56 bytes from 111.13.100.91: icmp_seq=4 ttl=54 time=19.152 ms

--- Ping statistics for www.baidu.com ---
5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss
round-trip min/avg/max/std-dev = 19.152/30.132/68.621/19.279 ms
<H3C>%Oct 10 14:50:27:006 2016 H3C PING/6/PING_STATISTICS: Ping statistics for w
ww.baidu.com: 5 packet(s) transmitted, 5 packet(s) received, 0.0% packet loss, r
ound-trip min/avg/max/std-dev = 19.152/30.132/68.621/19.279 ms.
```

#### 4. 将 AP 设备接入单车服务器后, 观察 AC-AP 工作情况正常

# 单车服务器接口供电正常。

```
[H3C] dis poe interface GigabitEthernet 0/1
PoE Status          : Enabled
Power Priority       : Low
Oper                : On
IEEE Class          : 3
Detection Status    : Delivering Power
Power Mode          : Signal
Current Power       : 2000    mW
Average Power       : 2439    mW
Peak Power          : 2700    mW
Max Power           : 15400   mW
Electric Current    : 39      mA
```

```
Voltage          : 53.3    V
PD Description   :
```

```
[H3C]
```

**# 单车服务器成功为 AP 设备分配 ip 地址。**

```
[H3C] display dhcp server ip-in-use
```

```
IP address      Client identifier/   Lease expiration      Type
                Hardware address
192.168.100.2   0150-da00-d251-a0    Oct 11 15:07:30 2016  Auto(C)
```

```
[H3C]
```

**# AC-AP 成功建立 capwap 隧道。**

```
[H3C] display wlan ap all
```

```
Total number of APs: 1
Total number of connected APs: 1
Total number of connected manual APs: 1
Total number of connected auto APs: 0
Total number of connected common APs: 1
Total number of connected WTUs: 0
Total number of inside APs: 0
Maximum supported APs: 128
Remaining APs: 127
Total AP licenses: 8
Remaining AP licenses: 7
```

#### AP information

```
State : I = Idle,      J = Join,      JA = JoinAck,    IL = ImageLoad
        C = Config,    DC = DataCheck, R = Run,      M = Master,    B = Backup
```

AP name	AP ID	State	Model	Serial ID
50da-00d2-51a0	1	R/M	WA4320-TI	219801A0X98162E00033

```
[H3C]
```

**5. 手机终端可以成功接入无线网络并访问互联网**

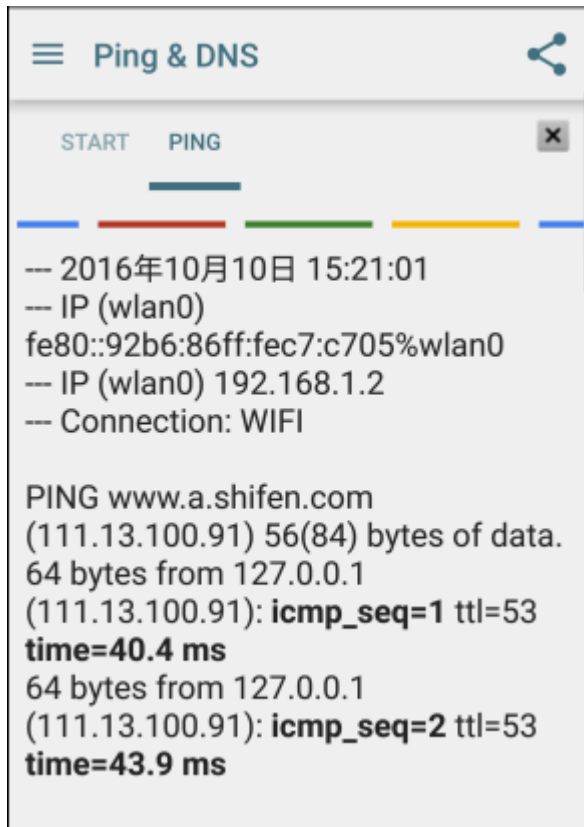
**# 手机终端开启无线功能可以搜索到 AP 发送的 ssid。**



# 手机终端可以成功接入无线并获取 IP 地址。



# 手机终端可以访问互联网。



## 2.6 配置文件

### 1. 中心服务器：

```
<H3C>display current-configuration
#
version 7.1.064, Alpha 0602
#
sysname H3C
#
dialer-group 1 rule ip permit
#
dhcp enable
#
dns proxy enable
#
password-recovery enable
#
vlan 1
#
dhcp server ip-pool 200
gateway-list 192.168.200.1
network 192.168.200.0 mask 255.255.255.0
```

```
address range 192.168.200.101 192.168.200.150
dns-list 192.168.200.1
#
controller Cellular1/0
eth-channel 0
#
controller Cellular2/0
#
controller Cellular3/0
#
controller Cellular4/0
#
controller Cellular5/0
#
controller Cellular6/0
#
controller Cellular7/0
#
controller Cellular8/0
#
controller Cellular9/0
#
interface NULL0
#
interface GigabitEthernet0/0
port link-mode route
ip address 192.168.200.1 255.255.255.0
#
interface GigabitEthernet0/1
port link-mode route
#
interface GigabitEthernet0/2
port link-mode route
#
interface GigabitEthernet0/3
port link-mode route
#
interface GigabitEthernet0/4
port link-mode route
#
interface GigabitEthernet0/5
port link-mode route
#
interface M-GigabitEthernet0
ip address 172.32.55.200 255.255.0.0
#
interface WLAN-Radio0/0
#
```



```
interface Eth-channell1/0:0
  dialer circular enable
  dialer-group 1
  dialer timer autodial 5
  dialer number *99# autodial
  ip address cellular-alloc
  nat outbound
#
  scheduler logfile size 16
#
line class console
  user-role network-admin
#
line class tty
  user-role network-operator
#
line class vty
  user-role network-operator
#
line con 0
  user-role network-admin
#
line vty 0 63
  user-role network-operator
#
  ip route-static 0.0.0.0 0 Eth-channell1/0:0
#
domain system
#
  domain default enable system
#
role name level-0
  description Predefined level-0 role
#
role name level-1
  description Predefined level-1 role
#
role name level-2
  description Predefined level-2 role
#
role name level-3
  description Predefined level-3 role
#
role name level-4
  description Predefined level-4 role
#
role name level-5
  description Predefined level-5 role
```

```
#
role name level-6
  description Predefined level-6 role
#
role name level-7
  description Predefined level-7 role
#
role name level-8
  description Predefined level-8 role
#
role name level-9
  description Predefined level-9 role
#
role name level-10
  description Predefined level-10 role
#
role name level-11
  description Predefined level-11 role
#
role name level-12
  description Predefined level-12 role
#
role name level-13
  description Predefined level-13 role
#
role name level-14
  description Predefined level-14 role
#
user-group system
#
wlan global-configuration
#
return
<H3C>
```

## 2. 单车服务器 :

```
<H3C>display current-configuration
#
version 7.1.064, Alpha 0602
#
sysname H3C
#
dhcp enable
#
dns proxy enable
#
password-recovery enable
#
```

```
vlan 1
#
vlan 100
#
vlan 200
#
vlan 300
#
dhcp server ip-pool 100
network 192.168.100.0 mask 255.255.255.0
option 43 hex 8007000001c0a86401
#
dhcp server ip-pool 300
gateway-list 192.168.1.1
network 192.168.1.0 mask 255.255.255.0
dns-list 192.168.1.1
#
wlan service-template 2g
ssid railway_test_2.4
vlan 300
client forwarding-location ap
service-template enable
#
wlan service-template 5g
ssid railway_test_5
vlan 300
client forwarding-location ap
service-template enable
#
interface NULL0
#
interface Vlan-interface100
ip address 192.168.100.1 255.255.255.0
#
interface Vlan-interface200
ip address dhcp-alloc
nat outbound
#
interface Vlan-interface300
ip address 192.168.1.1 255.255.255.0
#
interface GigabitEthernet0/9
port link-mode route
#
interface GigabitEthernet0/0
port link-mode bridge
port access vlan 200
poe enable
```

```
#
interface GigabitEthernet0/1
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 100 300
 port trunk pvid vlan 100
 poe enable
#
interface GigabitEthernet0/2
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 100 300
 port trunk pvid vlan 100
 poe enable
#
interface GigabitEthernet0/3
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 100 300
 port trunk pvid vlan 100
 poe enable
#
interface GigabitEthernet0/4
 port link-mode bridge
 port link-type trunk
 undo port trunk permit vlan 1
 port trunk permit vlan 100 300
 port trunk pvid vlan 100
 poe enable
#
interface GigabitEthernet0/5
 port link-mode bridge
 port access vlan 200
 poe enable
#
interface GigabitEthernet0/6
 port link-mode bridge
#
interface GigabitEthernet0/7
 port link-mode bridge
 port access vlan 200
 poe enable
#
interface GigabitEthernet0/8
 port link-mode bridge
```

```
#
interface M-GigabitEthernet0
#
  scheduler logfile size 16
#
line class console
  user-role network-admin
#
line class tty
  user-role network-operator
#
line class vty
  user-role network-operator
#
line con 0
  user-role network-admin
#
line vty 0 63
  authentication-mode scheme
  user-role network-operator
#
domain system
#
  domain default enable system
#
role name level-0
  description Predefined level-0 role
#
role name level-1
  description Predefined level-1 role
#
role name level-2
  description Predefined level-2 role
#
role name level-3
  description Predefined level-3 role
#
role name level-4
  description Predefined level-4 role
#
role name level-5
  description Predefined level-5 role
#
role name level-6
  description Predefined level-6 role
#
role name level-7
  description Predefined level-7 role
```

```
#
role name level-8
  description Predefined level-8 role
#
role name level-9
  description Predefined level-9 role
#
role name level-10
  description Predefined level-10 role
#
role name level-11
  description Predefined level-11 role
#
role name level-12
  description Predefined level-12 role
#
role name level-13
  description Predefined level-13 role
#
role name level-14
  description Predefined level-14 role
#
user-group system
#
local-user admin class manage
  password hash $h$6$QBGr50l+L/dsdbyi$P3TbeISgsCSNqoX8JECDLInSAMFuZwTiz8ha+aMtZwU
  dJlamKilL4MGdBIJuaMDCCwJCrpmSouxri0/QOhFiiw==
  service-type telnet http
  authorization-attribute user-role network-admin
#
  ip http enable
#
  wlan auto-ap enable
  wlan auto-persistent enable
#
  wlan global-configuration
  firmware-upgrade disable
#
  wlan ap-group default-group
#
  wlan ap-group ti
  if-match ip 192.168.100.0 255.255.255.0
  ap-model WA4320-TI
  map-configuration flash:/ti.txt
  radio 1
  radio enable
  service-template 5g
  radio 2
```

```
    radio enable
    service-template 2g
    gigabitethernet 1
#
wlan ap 50da-00d2-51a0 model WA4320-TI
    serial-id 219801A0X98162E00033
    radio 1
    radio 2
    gigabitethernet 1
#
return
<H3C>
```

### 3. WLAN AP 设备 :

```
[H3C] display current-configuration
#
version 7.1.064, ESS 2116
#
sysname H3C
#
telnet server enable
#
lldp global enable
#
password-recovery enable
#
vlan 1
#
vlan 300
#
interface NULL0
#
interface Vlan-interface1
    ip address dhcp-alloc
#
interface GigabitEthernet1/0/1
    port link-type trunk
    port trunk permit vlan 1 300
#
interface WLAN-Radio1/0/1
#
interface WLAN-Radio1/0/2
#
    scheduler logfile size 16
#
line class console
    user-role network-admin
#
```

```
line class vty
  user-role network-operator
#
line con 0
  user-role network-admin
#
line vty 0 4
  user-role network-operator
  set authentication password hash $h$6$vDWP2YhdKbyIt1ff$+OAvAn/uyC9MrSBthrek11NK
+h5AraRsnA9ImEvBIULGNhR02sIAnoil2nh1NZ+AgunysGouaQnt/zTzrYgJyg==
#
line vty 5 63
  user-role network-operator
#
  undo gratuitous-arp-learning enable
#
domain system
#
  domain default enable system
#
user-group system
#
return
[H3C]quit
```