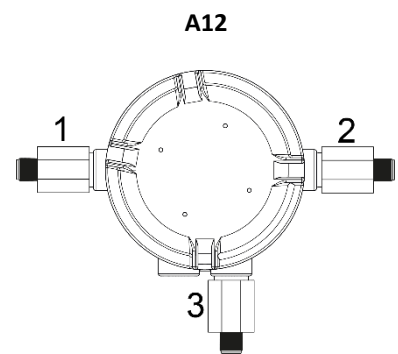
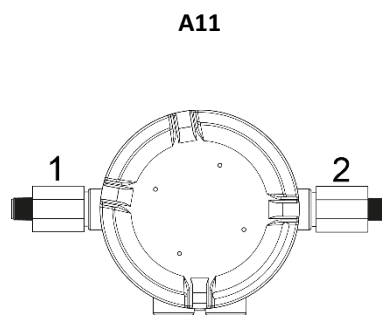
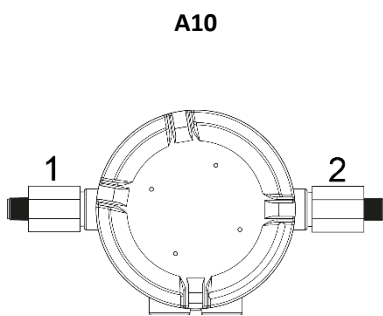


DESCRIPTION 1
 POWER SUPPLY 1
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 DEVICE CONFIGURATION 3
 TROUBLESHOOTING AND LED DEFINITION 7
 RF INFORMATION 7
 MAXIMUM PERMITTED RF THRESHOLD POWER (Pth) 10
 MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION 10

DESCRIPTION

The SWA & SWS A series is a WiFi access point equipped with 1 Ethernet port and up to 3 WiFi ports as follows:

Device version	Model	WiFi Port
A10	WiFi Access point 802.11n MIMO 2x2	n° 2
A11	WiFi Access point 802.11ac MIMO 2x2	n° 2
A12	WiFi Access point 802.11n MIMO 2x2 plus 802.11ac (1 stream)	n° 3



POWER SUPPLY

Screw terminals = Supply voltage: 18 ~ 60 VDC

RJ45 connector = Ppoe @ 24 VDC or PoE @ 48 VDC *

Max Power Consumption 8W

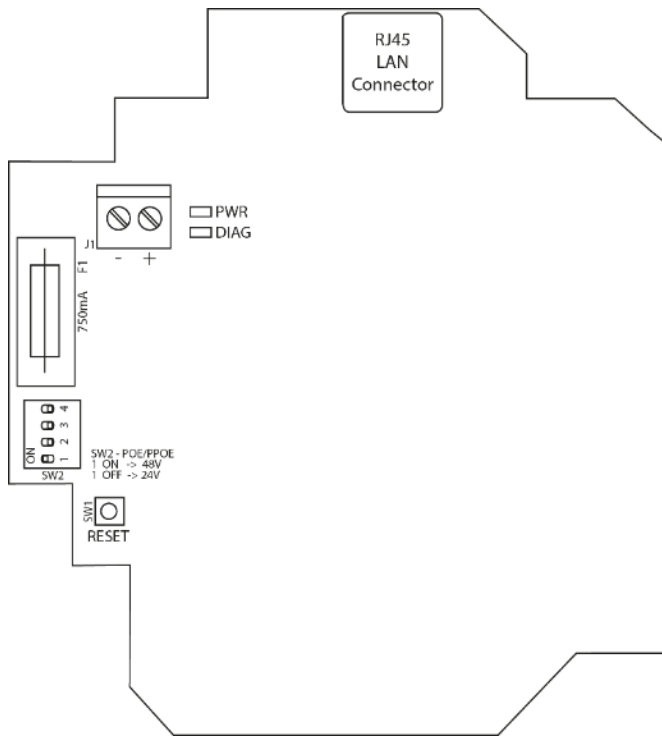
* Ppoe = Passive Power over Ethernet (operating voltage 24VDC), PoE = Power over Ethernet (operating voltage 48VDC)

TEMPERATURE RANGE

Device version	Model	Ambient temperature range
SWA	Aluminium enclosure	min -40°C – max +60°C
SWS	Stainless steel enclosure	min -40°C – max +50°C

WARNING : The unit can be reach a surface temperature of 70°C, use cable and cable glands / conduit Ex certified suitable for this temperature

WIRING



Label **Description**
RJ45 LAN connector
(PPoE @24VDC or PoE @ 48VDC)*

J1
Label **Description**
- Power supply - (18 ~ 60 VDC)
+ Power supply + (18 ~ 60 VDC)

F1
Label **Description**
750mA 5x20 mm power line fuse
(750mA fast-blow type)

Label **Description**
PWR Power led indication
DIAG Diagnostic led indication

SW1
Label **Description**
RESET Reset button

SW2
Label **Description**
POE/PPoE DIP switch for PoE / PPoE selection *
1 ON = 48V = PoE
1 OFF = 24V = PPoE

DIP switch operate only in case of PoE/PPoE power supply

** PoE = Power over Ethernet
(operating voltage 48VDC)
PPoE = Passive Power over Ethernet
(operating voltage 24VDC)*

Step 1 – ANTENNA CONNECTION

Connect the antenna before to turn on the device.

WARNING : use antenna only with 50Ω impedance and with operating frequency in according to technical data listed into the above paragraph “RF information”.

The device must be set according to limitation listed at paragraph MAXIMUM PERMITTED RF THRESHOLD POWER (Pth) for installation in Hazardous Location and the national regulation rules.

Step 2 – POWER SUPPLY CONNECTION

**WARNING : DO NOT WIRED POWER SUPPLY WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT.
FOR SAFETY REASONS WIRING MUST BE MADE ACCORDING TO WA & WS INSTALLATION AND OPERATION MANUAL**

The device can be powered by terminal strip (J1 18 ~ 60 VDC) or through PoE/PPoE.

In case of PoE (Power over Ethernet, 48VDC) set the DIP Switch SW2 nr. 1 to ON,

In case of PPoE (Passive Power over Ethernet, 24 VDC) set the DIP Switch SW2 nr. 1 to OFF

The DIP switch position has no influence in case of power supply through terminal strip J1

The device has no ON/OFF switch. It turns on automatically when power is applied. Check that the PWR led turn on
The DIAG led stay off for around 40 seconds, until the device is fully ready to use. Then the DIAG led turns blue.

Step 3 – ETHERNET CONNECTION

Connect the Ethernet cable (if it not connected in case of PoE or PPOE).

DEVICE CONFIGURATION**FACTORY SETTINGS:**

- IP address: 192.168.1.253
- Radio Interface disable, preset for access point mode
- SSID: acksys (broadcast)
- No security (no WEP, no WAP, no WAP2, no MAC filter)
- 802.11n or ac mode, 5GHz band, auto-channel
- WEB interface for device configuration: IP address: 192.168.1.253
User name: root
Password: no password set as factory setting

Step 1

Verify that the IP address factory setting is compatible with your network, if the IP address is not suitable for your network use Windows application **WaveManager** (available on web site www.acksys.fr).

The screenshot shows the WaveManager web interface. The left sidebar contains a menu with 'Product search', 'Setup', 'Database', and 'Settings'. The 'Setup' item is circled in red. The main area displays a table with columns: Model, Identif..., Serial..., Firmware, Version, IP Address, and Description. The table contains one entry: EmbedAir1000, 0000198D..., 17154101, E2148.AC.1, 3.18.3.1, 192.168.10..., and User-definable. Below this table is another table with columns: Role, Radio, C..., Mode, SSID, RSSI, dBm, Security, BSSID, and Assoc...

After the WaveManager installation run the application, select the EmbedAir1000 device then click to “Setup”: now you can configure the IP address or you can activate the DHCP client.

Step 2

Using your web browser open the WEB interface (IP address: 192.168.1.253) and select the "SETUP" tab:

The screenshot shows the 'SETUP' tab selected in the top navigation bar. On the left, there is a sidebar menu with options: DEVICE INFO, NETWORK, WIRELESS, SERVICES, and LOGS. The main content area is titled 'DEVICE INFORMATION' and contains two tables:

FIRMWARE INFORMATION	
WaveOs version:	3.18.3.1
Boot loader version:	3.0.6.1
Firmware ID:	E2148.AC.1

DEVICE INFORMATION	
Host name:	Acksys
Model:	EmbedAir1000/R2
Product version:	V1
Motherboard ID:	0000198d7819
Product serial number :	17154101

For setup page is required User name and password and for factory setup the user name is **root** and no password is required (these data can be changed under "TOOLS" tab, PASSWORD SETTINGS section)

The screenshot shows the 'AUTHORIZATION REQUIRED' page. It features a message: "Please enter your username and password." Below this is a form with two fields: "Username" (with a dropdown menu showing "root") and "Password" (with a password icon). At the bottom right, there are two buttons: "Reset" (with a red 'X' icon) and "Login" (with a green play icon).

On the "WIRELESS INTERFACES OVERVIEW" page you should first select your **country** in order to enforce applicable **regulation rules**. The country selector is located in the global parameters, near the bottom of the page

SETUP TOOLS STATUS

- PHYSICAL INTERFACES
- VIRTUAL INTERFACES
- NETWORK
- VPN
- BRIDGING
- ROUTING / FIREWALL
- QOS
- SERVICES

WIRELESS INTERFACES OVERVIEW

You can set up to 8 simultaneous roles (wifi interface types) per radio card, among the following combinations:

Combination	Channel selection		Max number of interfaces			
	Multiplicity	Can use DFS	Access point	Infrastructure client	Mesh point	Ad-hoc
802.11ac radio cards						
Multiple access points	single, auto, multiple	yes	8			
Client / bridge	single, auto, multiple, roaming*	yes		1		
SRCC	single	yes	auto	auto		
Other / Ad-hoc	single	no			unsupported	unsupported
802.11n only radio cards						
Multiple access points	single, auto, multiple	yes	8			
Portal	single	no	8		1	
Client / bridge	single, auto, multiple, roaming	yes		1		
Other / repeater	single	no	8	1 (non-roaming)	1	1

When using several roles, they all use the same shared channel; in this case, the client role must not be set to multichannel roaming. Repeater mode is a combination of two roles: access point + client.

* The roaming feature is not yet available for IEEE802.11ac cards.

WI-FI INTERFACE

WiFi 1: Wi-Fi 4 (802.11n) Wireless interface



CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
5	802.11g+n	acksys_1_2_4_test	Access Point (infrastructure)	WPA2-PSK (Personal)	

WI-FI INTERFACE

WiFi 2: Wi-Fi 5 (802.11ac) Wireless interface



CHANNEL	802.11 MODE	SSID	ROLE	SECURITY	ACTIONS
48	802.11ac+n	acksys_2_5_test	Access Point (infrastructure)	WPA2-PSK (Personal)	Interface disabled



GLOBAL PARAMETERS

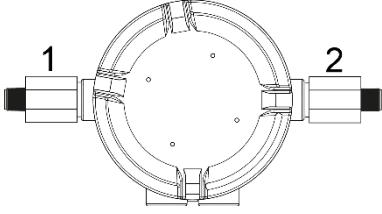
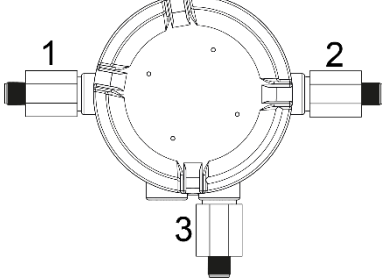
RADIO REGULATION AREA

Country

You can select radio interface to set up its WiFi parameters (you can also change IP configuration and services).

In function of device version the WiFi Interface available are:

Device version	Model		WiFi Interface used
A10	WiFi Access point 802.11n MIMO 2x2		WiFi Interface 1 only (antenna 1 and 2)

<p>A11</p>	<p>WiFi Access point 802.11ac MIMO 2x2</p>		<p>WiFi Interface 2 only (antenna 1 and 2)</p>
<p>A12</p>	<p>WiFi Access point 802.11n MIMO 2x2 plus 802.11ac (1 stream)</p>		<p>WiFi Interface 1 (antenna 1 & 2) and WiFi Interface 2 (antenna 3)</p>

For WiFi and LAN interface setup click on relative menu on “PHYSICAL INTERFACES” menu:

SETUP
TOOLS
STATUS

PHYSICAL INTERFACES

WiFi 1

WiFi 2

LAN

VIRTUAL INTERFACES

NETWORK

VPN

BRIDGING

ROUTING / FIREWALL

QOS

SERVICES

WIRELESS SETTINGS : WIFI 1

The *Device Configuration* section covers physical settings of the radio hardware which is shared among all defined wireless networks. Per network settings like encryption or operation mode are in the *Interface Configuration*.
If *SRCC* role is selected, most of the *Device Configuration* is irrelevant (please refer to the product user guide).

DEVICE CONFIGURATION

General Setup | a/b/g Data Rates | 802.11n Mcs | Advanced Settings

802.11 mode: 802.11g+n (2.4 GHz)
Changing the mode may affect the list in the 'a/b/g data rates' tab

HT mode: 40MHz 2nd channel below
Automatic 40MHz HT mode is not compatible with AP, Ad-hoc, Mesh and multi-interfaces

Automatic channel select: Automatic channel select is not compatible with Ad-hoc, Mesh and multi-interfaces

Channel: 5 (2.432 GHz) - Max Tx power 20 dBm
6 (2.437 GHz) - Max Tx power 20 dBm
7 (2.442 GHz) - Max Tx power 20 dBm
8 (2.447 GHz) - Max Tx power 20 dBm
9 (2.452 GHz) - Max Tx power 20 dBm
10 (2.457 GHz) - Max Tx power 20 dBm
This field is ignored in client proactive roaming mode; see 'Roaming' tab instead

INTERFACE CONFIGURATION

General Setup | Wireless Security | Advanced Settings | MAC Filter | Frame filters

Security: WPA2-PSK (Personal)

Protected management frame (802.11w): disable

Pre-Shared Key: ●●●●●●●● This key must have a length from 8 to 63 characters. If the key length is 64 characters it will be used directly as hexadecimal format

Group rekey interval: 600 Time interval for rekeying the GTK (broadcast/multicast encryption keys) in second

Pair rekey interval: 600 Time interval for rekeying the PTK (unicast encryption keys) in second

Master rekey interval: 86400 Time interval for rekeying the GMK (master key used internally to generate the GTK) in second

Set for each WiFi interface the following essential parameters:

- The operating mode: 802.11 mode, radio channel (take care about local legislation), SSID
- WiFi security parameters (WEP, WPA, WPA-PSK, WPA2, WPA2-PSK, SSID broadcast or not)

For more details consult Acksys WaveOS User Guide.

TROUBLESHOOTING AND LED DEFINITION

None of the LED indicators turn ON

- Verify the power supply (voltage, cabling)
- Verify the fuse F1

The WiFi link does not come up

- Make sure that the Wireless parameters of the Client (case sensitive SSID, 802.11 mode, radio channel and security) match those of the AP
- Check the radio conditions: distance between devices, placement of antennas, interferences and obstacles to radio waves propagation
- Try with all securities and encryption settings temporarily disabled
- Try another radio channel

How to restore factory settings?

- If the built-in web-based interface is reachable, you can use a browser to restore factory settings.
- Else, power up the unit, wait for the DIAG led to turn blue, then hold down the reset button (for at least 2 seconds) until DIAG goes off. Then release it and wait for the DIAG led to turn blue again, meaning that the product rebooted with its factory settings.

LED Definition

LED	Function
PWR	Green : power on Off : power not present
DIAG	Blue : when product is OK and initialized Flashing : when firmware in flash is not valid Off : for more then 2min with PWR led green indicate a Hardware/Software failure

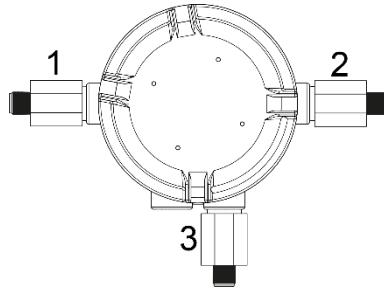
RF INFORMATION

Device version	
A10	<p>ANTENNA 1 AND 2 *</p> <p>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g and 802.11n</p> <p>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz</p> <p>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz</p> <p>Tx output power (Radio card output per chain, antenna excluded)</p> <p>802.11n HT20 2.4GHz band 20.5 dBm @ 7.2 Mbps (MCS 0) 18 dBm @ 72.2 Mbps (MCS 7)</p> <p>802.11n HT40 2.4GHz band 20.5 dBm @ 15 Mbps (MCS 0)</p>

	<p>18 dBm @ 150 Mbps (MCS 7) 802.11n HT20 5GHz band 18 dBm @ 7.2 Mbps (MCS 0) 15 dBm @ 72.2 Mbps (MCS 7) 802.11n HT40 5GHz band 18 dBm @ 15 Mbps (MCS 0) 15 dBm @ 150 Mbps (MCS 7) <i>Value for 1 stream, add 3 dBm for 2 streams</i></p>
A11	<p>ANTENNA 1 AND 2 *</p> <p>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g, 802.11n and 802.11ac</p> <p>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz</p> <p>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz</p> <p>Tx output power (Radio card output per chain, antenna excluded)</p> <p>802.11b 2.4GHz band 20 dBm @ 1 Mbps 20 dBm @ 11 Mbps</p> <p>802.11g 2.4GHz band 21 dBm @ 6 Mbps 18 dBm @ 54 Mbps</p> <p>802.11a 5GHz band 20 dBm @ 6 Mbps 15 dBm @ 54 Mbps</p> <p>802.11n HT20 2.4GHz band 21 dBm @ 7.2 Mbps (MCS 0) 16 dBm @ 72.2 Mbps (MCS 7)</p> <p>802.11n HT40 2.4GHz band 20 dBm @ 15 Mbps (MCS 0) 16 dBm @ 150 Mbps (MCS 7)</p> <p>802.11n/ac VHT20 5GHz band 19 dBm @ 7.2 Mbps (MCS 0) 14 dBm @ 72.2 Mbps (MCS 7) 13 dBm @ 86.7 Mbps (VHT MCS 8)</p> <p>802.11n/ac VHT40 5GHz band 18 dBm @ 15 Mbps (MCS 0) 14 dBm @ 150 Mbps (MCS 7) 13 dBm @ 200 Mbps (VHT MCS 9)</p> <p>802.11ac VHT80 5GHz band 18 dBm @ 32.5 Mbps (MCS 0) 14 dBm @ 325 Mbps (MCS 7) 13 dBm @ 433.3 Mbps (VHT MCS 9)</p> <p><i>Value for 1 chain, add 3 dBm for 2 chains (Tolerance ± 2 dB)</i></p>
A12	<p>ANTENNA 1 AND 2 *</p> <p>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g and 802.11n</p> <p>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz</p> <p>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz</p> <p>Tx output power (Radio card output per chain, antenna excluded)</p> <p>802.11n HT20 2.4GHz band 20.5 dBm @ 7.2 Mbps (MCS 0) 18 dBm @ 72.2 Mbps (MCS 7)</p> <p>802.11n HT40 2.4GHz band 20.5 dBm @ 15 Mbps (MCS 0) 18 dBm @ 150 Mbps (MCS 7)</p> <p>802.11n HT20 5GHz band 18 dBm @ 7.2 Mbps (MCS 0) 15 dBm @ 72.2 Mbps (MCS 7)</p> <p>802.11n HT40 5GHz band 18 dBm @ 15 Mbps (MCS 0) 15 dBm @ 150 Mbps (MCS 7)</p> <p><i>Value for 1 stream, add 3 dBm for 2 streams</i></p> <p>ANTENNA 3 *</p> <p>Radio modes: Support for IEEE 801.11a/h, 802.11b, 802.11g, 802.11n and 802.11ac</p> <p>Frequency band for 802.11a/n : 5 GHz; 5.170 to 5.835 GHz</p> <p>Frequency band for 802.11b/g/n : 2.4 GHz; 2.402 to 2.494 GHz</p> <p>Tx output power (Radio card output per chain, antenna excluded)</p>

802.11b 2.4GHz band	20 dBm @ 1 Mbps 20 dBm @ 11 Mbps
802.11g 2.4GHz band	21 dBm @ 6 Mbps 18 dBm @ 54 Mbps
802.11a 5GHz band	20 dBm @ 6 Mbps 15 dBm @ 54 Mbps
802.11n HT20 2.4GHz band	21 dBm @ 7.2 Mbps (MCS 0) 16 dBm @ 72.2 Mbps (MCS 7)
802.11n HT40 2.4GHz band	20 dBm @ 15 Mbps (MCS 0) 16 dBm @ 150 Mbps (MCS 7)
802.11n/ac VHT20 5GHz band	19 dBm @ 7.2 Mbps (MCS 0) 14 dBm @ 72.2 Mbps (MCS 7) 13 dBm @ 86.7 Mbps (VHT MCS 8)
802.11n/ac VHT40 5GHz band	18 dBm @ 15 Mbps (MCS 0) 14 dBm @ 150 Mbps (MCS 7) 13 dBm @ 200 Mbps (VHT MCS 9)
802.11ac VHT80 5GHz band	18 dBm @ 32.5 Mbps (MCS 0) 14 dBm @ 325 Mbps (MCS 7) 13 dBm @ 433.3 Mbps (VHT MCS 9)

* Antenna position



MAXIMUM PERMITTED RF THRESHOLD POWER (Pth)

The RF threshold power (Pth), sometimes called the effective isotropic radiated power (EIRP), as defined in IEC /EN 60079-0, is the product of the effective output power of the transmitter multiplied by the antenna gain. The maximum threshold powers for each equipment group as defined by Table 4 in IEC/EN 60079-0 are provided below.

Because most antennas list the gain relative to an isotropic radiator (dBi) instead of the raw power gain, it is often easier to simply add the antenna gain in dBi to the radio output power in decibel-milliwatts (dBm). Any added cable loss between the RF output and the antenna may also be factored in.

$$P_{th (dBm)} = \text{RF output power}_{(dBm)} + \text{Antenna gain}_{(dBi)} - \text{Coax cable loss between RF output and Antenna}_{(dB)}$$

The resulting threshold power calculated by the above formula MUST be below the threshold power for the operating area group rating below.

Equipment for	Threshold Power (W)	Threshold Power (dBm)
Group I	6	37.7
Group IIA	6	37.7
Group IIB	3.5	35.4
Group IIC	2	33.0
Group III	6	37.7

The above threshold level refer to installation in classified area Ex according to IEC/EN 60079-0 standard.

The use of device differs from one region and/or country to another. The user of the device must take care that the device is operated only according to local rules and standard or without the permission of the local authorities on frequencies other than those specifically reserved and intended for use without a specific permit. More detailed information is available at the local frequency management authority.

MAXIMUM JOULES CALCULATION IN CASE OF COAX CABLE INSTALLATION

In case of use of a coax cable installation for antenna installation the adding cable need to be evaluating to ensure that the maximum energy stored on cable not exceeded the value allowable per IEC/EN 60079-11:

Max energy (Joules) allowed per IEC/EN 60079-11	
Group I	1500 μJ
Group IIA	950 μJ
Group IIB	250 μJ
Group IIC	50 μJ

The calculation can be done according to following equation:

$$E = \frac{1}{2} * \left\{ (C_1 + C_2) * \left[(1.5 * (\sqrt{R * P})) \right]^2 \right\}$$

Where:

E = Energy

C₁ = Antenna Barrier Capacitance (18 pF)

C₂ = Coax cable capacitance

R = Impedance (50Ω)

P = RF power output (18 dBm, 63 mW)

1.5 = Safety Factor

Example:

Antenna cable capacitance = 1195 pF

$$E = \frac{1}{2} * \left\{ (18pF + 1195pF) * 7.08 \right\} = 0,00858\mu J$$

Answer = 0,00858 μJ acceptable for any Group