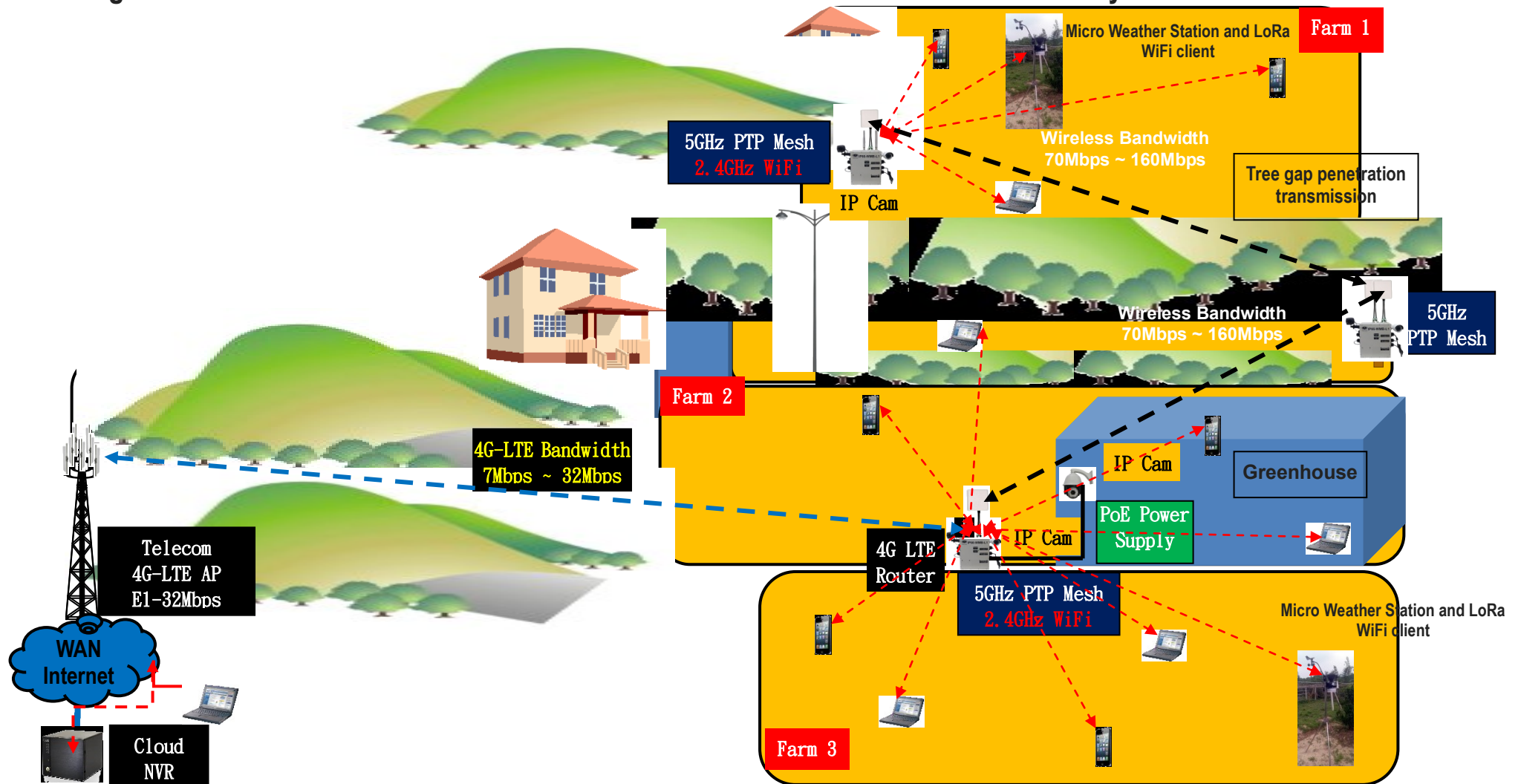


『 IOP-IP66-WMB-L1 Series 』 4G-LTE + PTP Mesh wireless surveillance transmission backbone + WiFi wireless Internet service system

Outdoor high and low temperature IP66 wireless mobile monitoring system

<< With multi-function integration and extension expansion function >>

1. Design of 4G-LTE and WiFi wireless surveillance and wireless Internet transmission system for AI Farm



2. 『IOP-E2OB-SP02-PSED-000』PTP Mesh wireless surveillance backbone + WiFi wireless Internet service system Farm1



IOP-E2OB-SP02-PSED-000 integrates various system devices

1. Outdoor wireless transmission equipment:

- EL-N-2 RF1 : WiFi AP wireless internet base station (AP1 - 2.4GHz)
- EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz)

2. Outdoor DC UPS mobile power system

- USSP-1202-01A 29WH (2.3Ah @ 12.8V)

3. 4Port Switch

4. 802.3af/at standard PoE Injector

- PCBA-DPOE-PSP4830-S

5. [Special for minefields] Lightning protection and surge protection

- Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X
- 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X

3. 『IOP-E2BB-SP02-PSED-000』 PTP Mesh wireless surveillance backbone system Farm 2



IOP-E2BB-SP02-PSED-000 integrates various system devices

1. Outdoor wireless transmission equipment:

- EL-N-2 RF1 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz)
- EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz)

2. Outdoor DC UPS mobile power system

- USSP-1202-01A 29WH (2.3Ah @ 12.8V)

3. 4Port Switch

4. 802.3af/at standard PoE Injector

- PCBA-DPOE-PSP4830-S

5. [Special for minefields] Lightning protection and surge protection

- Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X
- 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X

4. 『IOP-E2OB-SP02-PSED-050』 4G-LTE + PTP Mesh wireless surveillance backbone + WiFi wireless Internet service system Farm3



IOP-E2OB-SP02-PSED-050 integrates various system devices

1. 4G-LTE Router :
 - R200LC
2. Outdoor wireless transmission equipment:
 - EL-N-2 RF1 : WiFi AP wireless internet base station (AP1 - 2.4GHz)
 - EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz)
3. Outdoor DC UPS mobile power system
 - USSP-1206-03A 74WH (5.8Ah @ 12.8V)
4. 8Port Switch
5. 802.3af/at standard PoE Injector
 - PCBA-DPOE-PSP4830-S
6. [Special for minefields] Lightning protection and surge protection
 - Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X
 - 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X

5. Wireless surveillance transmission system rain signal attenuation formula calculation

- Set the 1 Km rain attenuation value of 5 GHz wireless transmission, and calculate the rainfall at 100 mm/hr; calculation result: The rain attenuation is less than 0.5dBm.

WiFi 2.4 ~ 2.485GHz & 5.25 ~ 5.85GHz 電波大雨衰減(Rain Attenuation)估 算 單位 : dB													
PtP		2.4GHz ~ 2.485GHz Frequency						5GHz ~ 5.85GHz Frequency					
Rainfall Rate		100mm/hr			200mm/hr			100mm/hr			200mm/hr		
Km	EPD/Km	2.4	2.45	2.485	2.4	2.45	2.485	5.25	5.5	5.85	5.25	5.5	5.85
1	0.64	0.06	0.07	0.07	0.15	0.16	0.16	0.41	0.46	0.53	0.96	1.07	1.23

6. Wireless surveillance transmission system transmission signal estimation

- Wireless backbone transmission signal value calculation:

→ According to the designed multi-point hops platform, the point-to-point distance is mostly within 1Km.

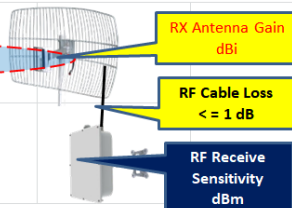
Recommended to use 5GHz 16dBi directional plate antenna within 2Km

The wireless backbone connection signal value can be estimated to be more than -55dBm, and the full-speed transmission bandwidth of 160Mbps can be achieved.



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RX Antenna Gain dBi

RF Cable Loss <= 1 dB

RF Receive Sensitivity dBm

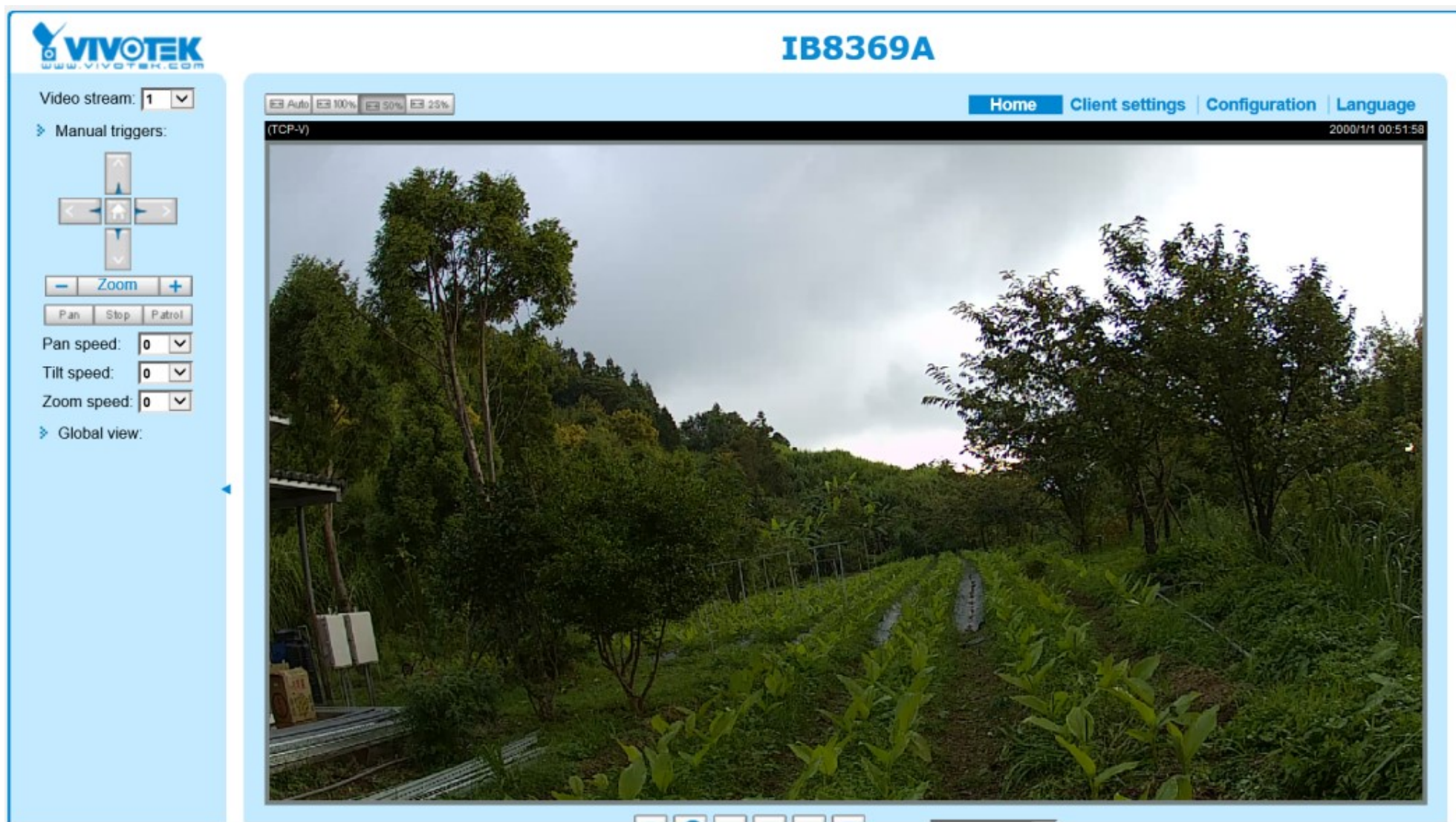
Air Space Loss = - 92.4dBm - 20*LOG(Frequency) - 20*LOG(Distance)

Point to Point Receive Sensitivity (RSSI) Suggest

1. for Wireless Backbone System : -50dBm < RSSI < -30dBm
 2. for Wireless Surveillance System : -55dBm < RSSI < -35dBm
 3. for Wireless Surf Internet Coverage System : -60dBm < RSSI < -40dBm
 Note: Receive Sensitivity (RSSI) don't under > -20dBm, it will have effect of Hearing Loss

無線鏈路訊號值(dBm)計算 (Wireless PtP Signal Sensitivity Calculation)											
傳輸鏈路訊號計算 (Signal Selectivity Calculation)	RF Output Power dBm (Maxmum)	RF Cable Loss dB (1m=0.6dB)	TX Antenna Gain dBi	Space Loss = 92.4	Frequency Loss GHz	Distance Loss Km	Rain Loss = 2 dB	Tree Loss 1m=5dB	RX Antenna Gain dBi	RF Cable Loss Db (1m=0.6dB)	
參數定義 (Parameter Definition)	無線最大輸出功率	RF線損耗	天線增益	空間衰減	頻率衰減	距離衰減	雨衰	樹衰	天線增益	RF線損耗	
請填入數據 (Please fill in your data)	23	1	16	92.4	5.85	1	0.5	0	16	1	
計算結果 (Calculation Results)	-55.24										

7. Wireless surveillance transmission system transmits camera screen (farm 1)



8. The number of equipment erection list

Outdoor PTP MESH wireless transmission system equipment list					
No.	Device name	Equipment model	Brief specifications	Quantity	Remark
1	IOP-IP66-WMB-L1 Series -With multi-functional integration and extension expansion function 	IOP-E2OB-SP02-PSED-000 	IOP-E2OB-SP02-PSED-000 integrates various system devices 1. Outdoor wireless transmission equipment: ■ EL-N-2 RF1 : WiFi AP wireless internet base station (AP1 - 2.4GHz) ■ EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz) 2. Outdoor DC UPS mobile power system ■ USSP-1202-01A 29WH (2.3Ah @ 12.8V) 3. 4Port Switch 4. 802.3af/at standard PoE Injector ■ PCBA-DPOE-PSP4830-S 5. [Special for minefields] Lightning protection and surge protection ■ Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X ■ 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X	1	
2	IOP-IP66-WMB-L1 Series -With multi-functional integration and extension expansion function 	IOP-E2BB-SP02-PSED-000 	IOP-E2BB-SP02-PSED-000 integrates various system devices 1. Outdoor wireless transmission equipment: ■ EL-N-2 RF1 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz) ■ EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz) 2. Outdoor DC UPS mobile power system ■ USSP-1202-01A 29WH (2.3Ah @ 12.8V) 3. 4Port Switch 4. 802.3af/at standard PoE Injector ■ PCBA-DPOE-PSP4830-S 5. [Special for minefields] Lightning protection and surge protection ■ Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X ■ 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X	1	

3	IOP-IP66-WMB-L1 Series -With multi-functional integration and extension expansion function 	IOP-E20B-SP02-PSED-000 	IOP-E20B-SP02-PSED-050 integrates various system devices 1. 4G-LTE Router : ■ R200LC 2. Outdoor wireless transmission equipment: ■ EL-N-2 RF1 : WiFi AP wireless internet base station (AP1 - 2.4GHz) ■ EL-N-2 RF2 : WiFi PTP Mesh Wireless Backbone Base Station (5.8GHz) 3. Outdoor DC UPS mobile power system ■ USSP-1206-03A 74WH (5.8Ah @ 12.8V) 4. 8Port Switch 5. 802.3af/at standard PoE Injector ■ PCBA-DPOE-PSP4830-S 6. [Special for minefields] Lightning protection and surge protection ■ Ethernet RJ-45 Port --PCBA-SELP-1P10KA-X ■ 1DC to 4DC DC Port -- PCBA-LPDC-4D10KA-X	1	
4	2.4GHz 4dBi & 5GHz 7dBi Dual Band Omni Antenna	IOP-OANMO-580536025 	1.Frequency: 2400~2500MHz;5150~5875 MHz 2.Gain: 4dBi@2.4GHz; 7dBi@5GHz 3.HPBW / Horizontal 360° 4.HPBW / Vertical 30° 5.Connector: N-Type Plug * 1 6.Weight: 0.07Kg 7.Size:Φ22 × 183 mm	4	
5	Base station with MIMO antenna Plane-Oriented Medium Gain Antenna	IOP-PANJO-5M1602422 	1. Pointing plate antenna 2.5GHz 15-16dBi Outdoor Antenna 3. Frequency range: 5.150-5.875GHz 4. Horizontal / Vertical Angle: Horizontal: 17-24° /Vertical : 17-24° 5. Connector: RG233, 70cm & N Jack × 2 6. Dimensions: 210 x 210 x 73 mm 7. IPX5, resistant to wind pressure 216Km/hr	4	

6	RF Connector Self-Bonding Rainproof Insulating Tape	IOP-RMTOC-173830510B 	1. Length / roll: 305cm $\pm$ 2cm 2. Width: 38mm $\pm$ 2mm 3. Thickness: 1.35mm $\pm$ 0.5mm 4. Elongation: 1000% 5. Adhesion: Detachment < 2cm 6. Breaking Strength: >2kg 7. Water Absorption: <0.2% 8. Insulation Resistance: >1 $\times$ 106 M Ω +	2	
7	Outdoor Industrial 4G-LTE Router	4G Router -- R200LC 	1. Support 4G-LTE, backward compatible with 3G networks 2. Support WEP, WPA / WPA2 / TKIP / AES and other authentication and encryption methods 3. Support virtual data and private network (APN/VPDN) 4. Support TCP/IP protocol, Telnet, HTTP, SNMP, PPP, PPPoE and other network protocols 5. Support VPN Client (PPTP, L2TP), Open VPN, IPSec, HTTPs, SSH, etc. 6. R200LC supports 1Port LAN & 1Port WAN or Dual LAN Port	1	