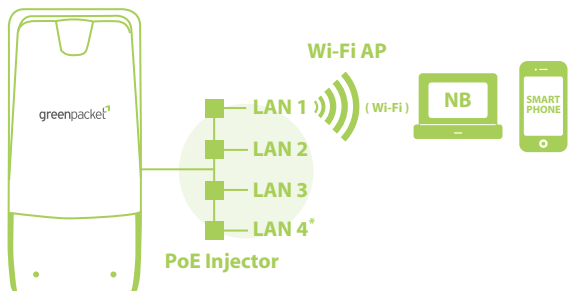


WiMAX / TD-LTE Dual Mode Residential Outdoor CPE

OD's WiMAX / LTE dual-mode capability and its financial advantages allow operator a smooth transition, and enable operator to benefit from the best of both worlds.



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(* OD can serve up to 4 households)



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Benefits at A Glance

- Support WiMAX and TDD-LTE Dual Mode
- Device Management Made Easy for Operators
- High Performance -- Extending service coverage
- Roofed Structure Design -- Compact yet Robust
- Financial Benefits -- CAPEX and OPEX

Support WiMAX and TDD-LTE Dual Mode

Greenpacket's OD series is the world's very first WiMAX / LTE dual-mode ODU that offers operator the flexibility of smooth transition from WiMAX to LTE.

Operator can count on this single device deployment that can support both WiMAX & LTE technologies allowing for a gradually migration with uninterrupted customer service. OD allows the operator to benefit from the best of both worlds.

OD is uniquely designed as a single-device solution to support dual-mode WiMAX and TDD LTE service. It covers all the WiMAX bands, and supports the majority of TDD LTE bands. One single OD device can therefore be utilized during and after the network transition without expending extra cost on devices deployment. This helps minimize CAPEX.

In addition to reduce the cost of deployment, dual-mode device lowers the risks of maintenance due to the light system infrastructure. It ensures operator a simpler and more efficient WiMAX / LTE management, and reduces OPEX consequently.

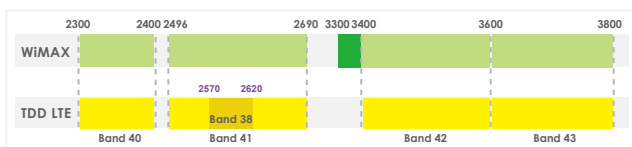


Figure 1

Device Management Made Easy for Operators

Greenpacket device management (GDM) system will be bundled with OD. This enables operators to better and wisely manage, configure, or even monitor their deployed CPEs at reduced cost and with no need to incur more service expense, such as auto-configuration servers (ACS).

Once OD is connected to the Internet via LTE, the built-in device manager will automatically report its device

information, such as MAC, IP, and BSID, to the managing server by HTTP request. Such data is rather small in size compared to conventional ACS data load. GDM will also intelligently determine its task priority depending on CPE operations.

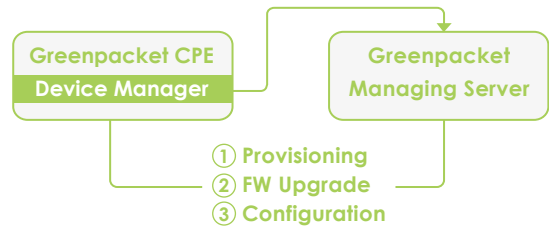


Figure 2: How GDM Works

Greenpacket web server at backend can further match the retrieved device information with its predefined group. Then, the managing server can automatically upgrade firmware, configure CPEs, and proceed provisioning per groups, schedules, or geographic regions.

How GDM benefits operators:

	GDM	ACS
Protocol	via HTTP request Greenpacket Proprietary	SNMP TR-069
By Schedule	Available	Available
By Region	Available	Not Available
Provisioning	Available	Available
OTA FW Upgrade	Available	Available
Architecture	<ul style="list-style-type: none"> Streamlined HTTP server (Web server) 	<ul style="list-style-type: none"> Complicated Management server plus ACS server Data model required
Manual Effort	No IOT required.	Each CPE type needs successful IOT with the ACS server.
Adaptability	Available	Not Available
Total cost	Relatively low	Relatively high
Ownership	No loyalty fee required	US\$1 per CPE license

High performance

Powerful Integrated Antenna and High Output Power helps extend service coverage.

OD unit, comes with powerful integrated antenna and 26.5dBm output power, is tailored to get higher transmit EIRP. A high quality patch antenna, with 11 dBi gain, is integrated inside. High antenna gain provides better signal strength for both uplink and downlink, and ensures stable connectivity. This helps improve subscribers' user experience consequently. In addition, OD transmission power is up to 26.5 dBm. The base station cell coverage hence can be improved and enlarged with the higher transmit EIRP by deploying OD series.

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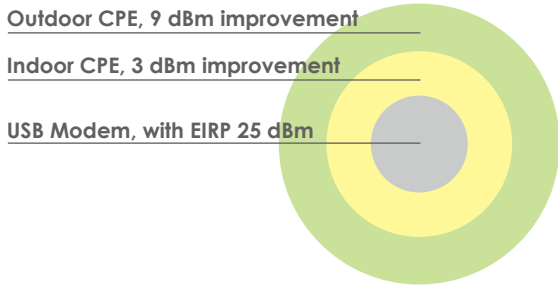


Figure 3: Coverage Distance Difference between ODU, IDU and USB modem

Roofed Structure Design – Compact yet Robust

The unique form factor of OD secures the investments of operator and minimizes the CAPEX and OPEX, while offering high performance capabilities to operator.

To withstand the severe environmental challenges traditional outdoor CPEs always come with the bulky and heavy-weight enclosure design, which makes the installation quite difficult and annoying. OD's roofed structure offering a simpler sheltering solution than its rivals, whose complex housing structure incur extra material and production cost significantly. Thanks to OD's brilliant roofed structure, total number of assembly components is reduced. Featuring a compact, elegant and light-weight design, OD can be easily and steadily pole-mounted in the desired outdoor locations to get stable signal.

All these factors contribute to the rugged and long lasting OD outdoor solution; and enable higher throughput, range, and capacity with simpler deployment and management. Operator can therefore expect less customer complaints, RMA, and get improved users' experience consequently.

Protection of Enclosure

OD is IP65 compliant, which means it is totally protected against dust, and against jets of water from any direction.

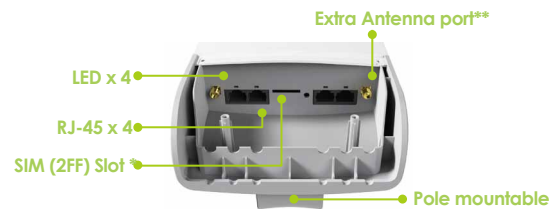
IP	6		5	
International Protection Rating	1 st Digit	Solid Object Protection: Dust Tight	2 nd Digit	Water Protection: Protected against jetting water
IP Rate Symbol				

Figure 4: IP65 compliant

Financial Benefits – CAPEX and OPEX

Reduce CAPEX, one Unit Shared by 4

OD is equipped with 4 RJ-45 Ethernet Ports; thus one OD unit is capable to serve up to 4 subscribers concurrently. This creative setup helps lower the CAPEX and OPEX per subscriber. The OD's high performance design is tailored for long range wireless broadband connection. For residential area where wire-line broadband service is unserved or underserved, operator can rapidly establish the wireless network connection and grow their customer base by deploying GP's OD system. In the market segments such as SOHO locations, campus locations, remote branch offices, where a cost-effective connection is required in a short time, OD can be the optimal solution to meet the requirements.



* Support 1.8V / 3.3V 2FF USIM
** For Wi-Fi feature (optional)

Figure 5

Reduce CAPEX, money-saving Power Supply

A typical outdoor unit uses the expensive standard IEEE802.3 af / at "Power over Ethernet", to enable power supply and data transferring through Ethernet cable. Rather than adopting the expensive standard PoE, OD uses uniquely designed / stripped-down PoE injector which can support the range of 20 to 30 meters*.

(* Power supply, type of cable and powered device will decide the real distance.)

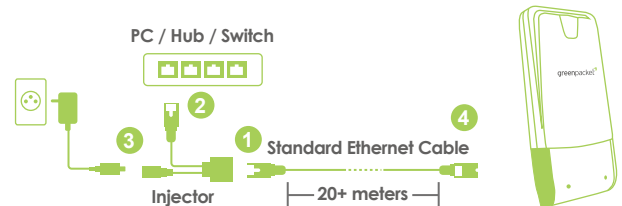


Figure 6: GP PoE injector

Reduce OPEX, easy pole mounting

Light-weighted, slim and elegant design makes it easier to be hung on the roof edge.

Simpler pole mounting design enable operator to install OD at the desired position to receive best RF signal.



Figure 7: Easy Pole Mounting

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Package information

- OD outdoor CPE x 1
- PoE Injector x 1 *
- Ethernet cable (2 meters) x 1 **
- Metal Strap x 3
- Box Dimension: To be updated
- Device Dimension:



(* Default SKU is with one PoE and one Ethernet cable. Additional PoE injectors & cables, up to 4 pairs, can be delivered upon customers' order requirement.
** 2 m Ethernet cable connecting PoE to computer)

Technical Specification

User Interface

SIM Card	<ul style="list-style-type: none"> • SIM Slot x 1 • Support 1.8V and 3.3V SIM and USIM
LAN	<ul style="list-style-type: none"> • RJ-45 x 4
LED Indication	<ul style="list-style-type: none"> • Power status • LTE signal
Power Supply	<ul style="list-style-type: none"> • GP PoE Injector x 1
Device Management	<ul style="list-style-type: none"> • Local FW update via Web interface • OTA via HTTP or FTP Update • Greenpacket Device Manager • TR-069* • OMA-DM* <p><i>*TR-069 & OMA-DM may require IOT efforts</i></p>

Electrical & Mechanical

Dimensions (H x W x D)	• 272 x 132 x 51 (mm)
Weight	• Around 1 kg (Device only)
Power Supply	• GP PoE Injector (Details to be updated)
Temperature	<ul style="list-style-type: none"> • -20°C ~ 55°C (Operating) • -20°C ~ 70°C (Storage)
Humidity	<ul style="list-style-type: none"> • 10%~85% non-condensing (Operating) • 5%~95% non-condensing (Storage)
Material	• RoHS compliant

Physical Layer

Standard	<ul style="list-style-type: none"> • LTE: 3GPP Release 9 • WiMAX: IEEE802.16e-2009 																																																
Data Rate	<ul style="list-style-type: none"> • Downlink up to 100 Mbps • Uplink up to 50 Mbps 																																																
Frequency Range	<p>OD-235</p> <ul style="list-style-type: none"> • LTE: Band 40+ Band 41, Band 38+ Band 40 • WiMAX: 2.3GHz~2.7GHz <p>OD-350</p> <ul style="list-style-type: none"> • LTE: Band 42 and Band 43 (3.4GHz~3.8GHz) • WiMAX: 3.3GHz~3.8GHz 																																																
Max. RF Transmit Power	<ul style="list-style-type: none"> • LTE: 26.5 dBm (3GPP Spec: 23dBm) • WiMAX: 27 dBm 																																																
Rx Sensitivity (dBm)	<p>Comply with 3GPP TS 36.101</p> <table> <tr> <td>» 5MHz:</td> <td>QPSK 1/3 = -100</td> <td>QPSK 1/2 = -97</td> </tr> <tr> <td></td> <td>QPSK 3/4 = -94</td> <td>16QAM 1/2 = -91</td> </tr> <tr> <td></td> <td>16QAM 3/4 = -86</td> <td>64QAM 2/3 = -83</td> </tr> <tr> <td></td> <td>64QAM 3/4 = -80</td> <td>64QAM 4/5 = -79</td> </tr> <tr> <td>» 10MHz:</td> <td>QPSK 1/3 = -97</td> <td>QPSK 1/2 = -94</td> </tr> <tr> <td></td> <td>QPSK 3/4 = -91</td> <td>16QAM 1/2 = -88</td> </tr> <tr> <td></td> <td>16QAM 3/4 = -83</td> <td>64QAM 2/3 = -80</td> </tr> <tr> <td></td> <td>64QAM 3/4 = -77</td> <td>64QAM 4/5 = -76</td> </tr> <tr> <td>» 15MHz:</td> <td>QPSK 1/3 = -95.2</td> <td>QPSK 1/2 = -92.2</td> </tr> <tr> <td></td> <td>QPSK 3/4 = -89.2</td> <td>16QAM 1/2 = -86.2</td> </tr> <tr> <td></td> <td>16QAM 3/4 = -81.2</td> <td>64QAM 2/3 = -78.2</td> </tr> <tr> <td></td> <td>64QAM 3/4 = -75.2</td> <td>64QAM 4/5 = -74.2</td> </tr> <tr> <td>» 20MHz:</td> <td>QPSK 1/3 = -94</td> <td>QPSK 1/2 = -91</td> </tr> <tr> <td></td> <td>QPSK 3/4 = -88</td> <td>16QAM 1/2 = -85</td> </tr> <tr> <td></td> <td>6QAM 3/4 = -80</td> <td>64QAM 2/3 = -77</td> </tr> <tr> <td></td> <td>64QAM 3/4 = -74</td> <td>64QAM 4/5 = -73</td> </tr> </table>	» 5MHz:	QPSK 1/3 = -100	QPSK 1/2 = -97		QPSK 3/4 = -94	16QAM 1/2 = -91		16QAM 3/4 = -86	64QAM 2/3 = -83		64QAM 3/4 = -80	64QAM 4/5 = -79	» 10MHz:	QPSK 1/3 = -97	QPSK 1/2 = -94		QPSK 3/4 = -91	16QAM 1/2 = -88		16QAM 3/4 = -83	64QAM 2/3 = -80		64QAM 3/4 = -77	64QAM 4/5 = -76	» 15MHz:	QPSK 1/3 = -95.2	QPSK 1/2 = -92.2		QPSK 3/4 = -89.2	16QAM 1/2 = -86.2		16QAM 3/4 = -81.2	64QAM 2/3 = -78.2		64QAM 3/4 = -75.2	64QAM 4/5 = -74.2	» 20MHz:	QPSK 1/3 = -94	QPSK 1/2 = -91		QPSK 3/4 = -88	16QAM 1/2 = -85		6QAM 3/4 = -80	64QAM 2/3 = -77		64QAM 3/4 = -74	64QAM 4/5 = -73
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Antenna	<ul style="list-style-type: none"> • Built-in patch antenna • up to 11dBi at peak gain 																																																

Networking

Internet Protocol	<ul style="list-style-type: none"> • IPv4 • IPv4-IPv6 dual stack • IPv6
NAT	<ul style="list-style-type: none"> • NAT/NAPT • VPN Pass-through
ALG	<ul style="list-style-type: none"> • SIP, H.323, PPTP, FTP
DHCP	<ul style="list-style-type: none"> • DHCP Client • DHCP Server
Firewall	<ul style="list-style-type: none"> • Built-in Firewall
Port Forwarding	<ul style="list-style-type: none"> • Support

Regulation Compliance

CE	<ul style="list-style-type: none"> • RF EN302544-2 EN300328 EN301908-1 EN301908-13 EN301908-19 	<ul style="list-style-type: none"> • EMC EN55022 / 24 EN301489-1, -17 EN301489-1, -24 EN300386
FCC	<ul style="list-style-type: none"> • Safety EN60950-1 	
GCF	<ul style="list-style-type: none"> • Upon request 	
3GPP	<ul style="list-style-type: none"> • Upon request 	

For more information on Greenpacket's products and solutions, please contact us at marketing.gp@greenpacket.com