

**OMESH Networks Incorporation**  
[www.omeshnet.com](http://www.omeshnet.com)  
3 Kilkenny Drive  
Toronto ON, Canada M1W1J3  
Tel: 1-416-837-8980  
Fax: 1-416-977-2796  
Email: [info@omeshnet.com](mailto:info@omeshnet.com)

## Applicable Areas

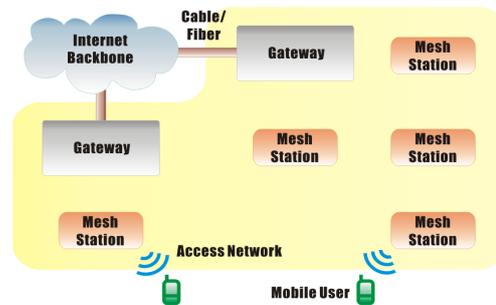
Over more than the past decade, there have been persistent efforts to realize anywhere-anytime broadband wireless Internet access. For example, there has been the migration from 2G (second generation) to 3G (third generation) in cellular networks; and there has also been the boom of WiFi (IEEE 802.11) hotspots. However, the limitations have shown: the evolution of cellular networks has not kept up with the bandwidth demands of consumer devices and network cost spiral upward; and WiFi hotspots have not been used to offload any substantial amount of traffic. In the age of smart phones, the cost of wireless bandwidth becomes a central issue for service providers world-wide, and cellular offload is an emerging market with enormous potential.

Mesh infrastructure for broadband wireless Internet access has emerged as a way to establish large wireless Internet hot-zones, blanketing municipal or community areas. These deployments have been rolling out internationally in many big cities, such as Toronto, Indianapolis, Philadelphia, Taipei, Moscow, etc. However, due to the need for installing a large number of gateways to limit the number of wireless hops, cost has been a barrier to possible ubiquitous municipal/enterprise mesh setup. As of now, most deployments can only cover city streets, limiting their coverage and revenue potential.

OMESH networking technology provides the most cost effective wireless bandwidth for broadband wireless Internet access. It resolves the dilemma by: 1) significantly reducing the infrastructure cost to achieve ubiquitous coverage; 2) improving the access capacity; 3) enabling reliable multimedia sessions; 4) providing easy integration with existing infrastructure including cellular networks, and 5) off-loading Internet data traffics on cellular networks. These differentiations can minimize the cost of broadband to service providers; and strengthen the revenue potential at the same time.

## Principles of the Solution

With the OMesh's solution, the network operator can set up Gateways according to traffic capacity needs and not hop limitations; and quickly roll-out Mesh Stations to ensure ubiquitous network coverage with reliable broadband services.



**Mesh Infrastructure for  
Broadband Wireless Internet Access**

- Mobile Users can get broadband wireless access to Mesh Stations; and seamless roaming (soft-handoffs) of the Mobile User among Mesh Stations being supported. The Access Network can be state-of-the-art access standards such as WiFi, giving the maximum user throughput of over 20Mbps. The Access Network can also be based on other technology.
- Mesh station can forward Mobile User traffic through (multiple) wireless hops to a Gateway and Internet Backbone, and vice versa. By the mesh networking technology: 1) reliable multimedia (real-time) traffic can be supported among Mesh Stations and Gateways; 2) dynamic (drop-and-play) deployment of Mesh Stations can be supported to achieve ubiquitous network coverage.
- When the mesh network is integrated with traditional wireless infrastructure such as cellular networks, accounting software is provided at the Gateways for user access control. The Gateways talk to carriers' core network to provide seamless vertical handoff between cellular networks and the mesh infrastructure with dual-mode user handsets.



## Technology and Comparison

The core technology of this solution is OPM (Opportunistic Mesh) Networks (or Large-scale Cognitive Networks), which sets forth how Mesh Stations can communicate to each other and to Gateways. OPM can dynamically establish large wireless networks without predetermined topology constraint and spectrum allocation, offering the convenience of drop-and-play deployment of Mesh Stations. It also uniquely provides reliable and real-time wireless communications over unlimited number of wireless hops. High throughput services are ensured by much better resource utilization; and network performance improves with network scale.

In the broadband access networks, by taking the equation of  $\text{bandwidth} \times \text{coverage} / \text{cost}$ , the OPM technology provides for the best formula as compared to alternatives. Its advantages can translate to:

- Fast roll out of the network and coverage expansion by dynamic drop-and-play Mesh Stations without the constraint of fiber/cable backhaul; the supported network capacity being dynamically adjustable;
- High-capacity guaranteed real-time wireless communication over unlimited number of wireless hops, capable of providing enriched wireless multimedia services;
- Compatible with physical radios and network-layer standards, so that the provided broadband access can be easily integrated with traditional cellular infrastructure; saving the high data-capacity cost and strengthening legacy voice services of cellular networks;
- Low power consumption; low cost and small footprint; adaptable to interference in unlicensed bands.

Here is a comparison of different broadband access solutions:

	Cellular / WiMAX	Hotspot WiFi	Municipal WiFi	<b>OPM</b>
User Throughput	<1Mbps	Usually 5-10Mbps	Usually 1-4Mbps	<b>Up to 20Mbps</b>
Real-time Multimedia	Supported	Partially	Not supported	<b>Supported</b>
Network Coverage	City and Rural Areas	Home /Office	City Streets	<b>City Areas</b>
Capital/Operational Cost	High	Low	Medium	<b>Low</b>
Scalability/Reliability	Limited by the availability of base station	Limited by the availability of AP	Limited by ~3-hop availability to gateway	<b>Unlimited multi-hop wireless</b>
Frequency	Multi-band licensed	2.4G/5.8G unlicensed	2.4G/5.8G unlicensed	<b>Unlicensed or licensed</b>

In the above table, the metrics of OPM are according to the assumption of WiFi access networks. Different access technology (e.g., femtocell) provides slightly different performance on user throughput.