

5G - FWA for bridging Digital Divide

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Extending 4G mobile services

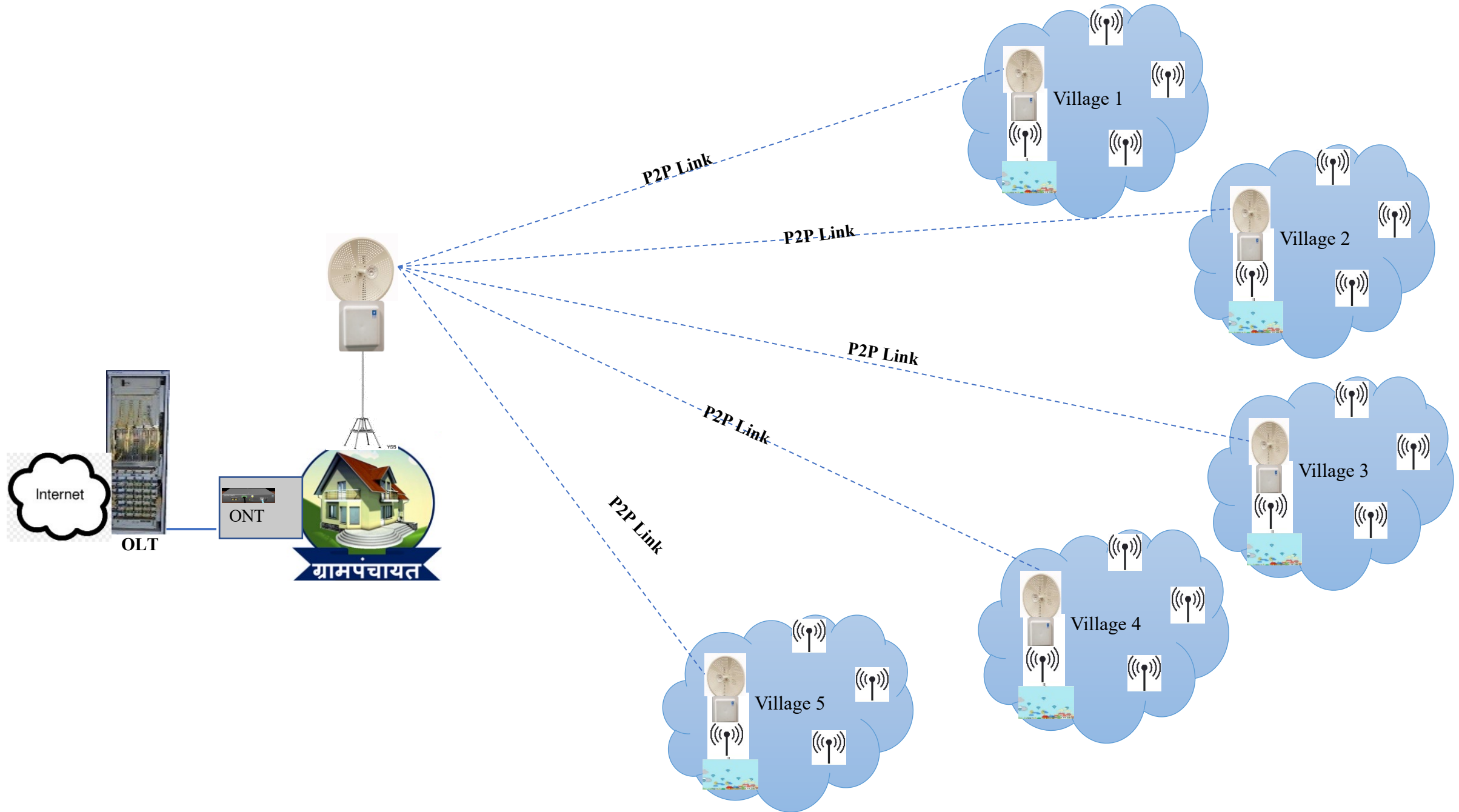
- Number of villages in India > 640,000
- Villages which do not have mobile coverage - 39,000
- Villages with 2G and 3G services - 6,200
- Total Villages - 45,200
- A special package with an outlay of more than US \$3 b has been approved to cover 31,000 villages.

Laying Optical Fibre Network

- Extending optical fibre to all villages
 - The Hon'ble Prime Minister of India has set up a target to extend optical fibres in all villages of the country.
 - So far, 180,000 villages have been covered under above scheme.

Using wireless technology

- Execution of Pilot Project in extending internet connectivity to the villages which do not have OFC.
- A site in Maharashtra, a province of India, was chosen for above.
- A 5 Ghz P2P link was used for connecting two villages. Hot spots were used to spread wi-fi signal in the village.



List of Sites with Throughput

GP Location (Backhaul) A End	GP/Village Name (B End)	Distance from POP (in KM)	Hotspot Installed	Through put (in Mbps)	Status
Borgaon Manju (Hotspot 04)	Anvi Mirjhapur	4.863	02	321	Commissioned
Sisa Udegaon (KVK) (Hotspot 03)	Sisa	0.5	01	200	Commissioned
	Masa	2.753	01	190	
	Dongargaon	1.195	01	100	
Palso Badhe (Hotspot 04)	Kaulkhed	3.5	02	220	Commissioned
	Khadka	4.5	02	180	
	Dahigaon	4	02	190	
	Bahirkhed	5.5	02	200	

Challenges remain

- 4G mobile coverage may be good for voice but not necessarily for good speed data.
- Roll out of OFC is time consuming.
- Wireless solutions may be used but throughput is limited (200 to 300 Mbps)

5G for Fixed Wireless Access

- With the introduction of 5G, mmwave above 6GHz, the speed of FWA is now comparable to fiber.
- In addition, technology advancement has made even below 6GHz spectrum more feasible for fixed wireless by applying massive MIMO technologies and wider bandwidth.
- 5G can provide 10 to 100 times more capacity than 4G and it has the potential to enable cost-efficient FWA solutions on a massive scale.

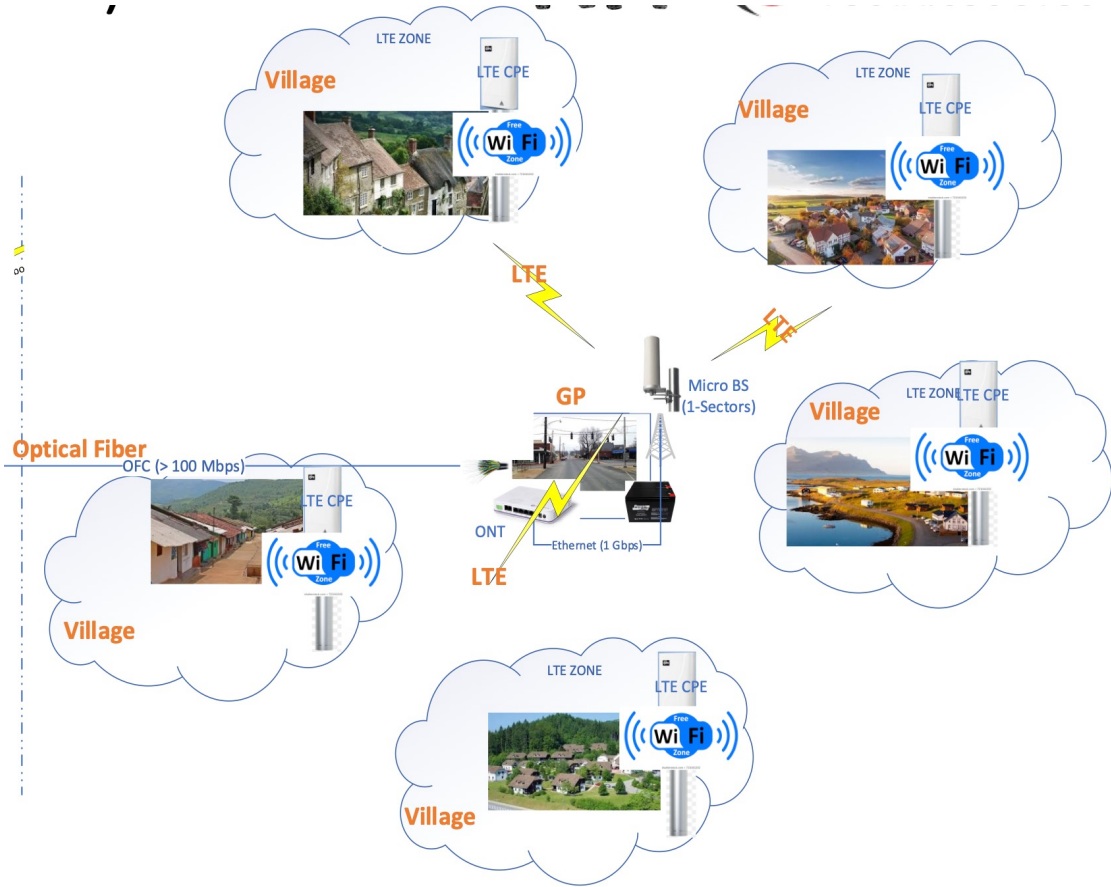
Sub- 6 CPE

- Maximum distance up to 15 Km from BTS.
- Up to 1 Gbps throughput per CPE
- Works in NLOS/LOS scenarios. Reduced range in NLOS
- Ideal for low population density areas.

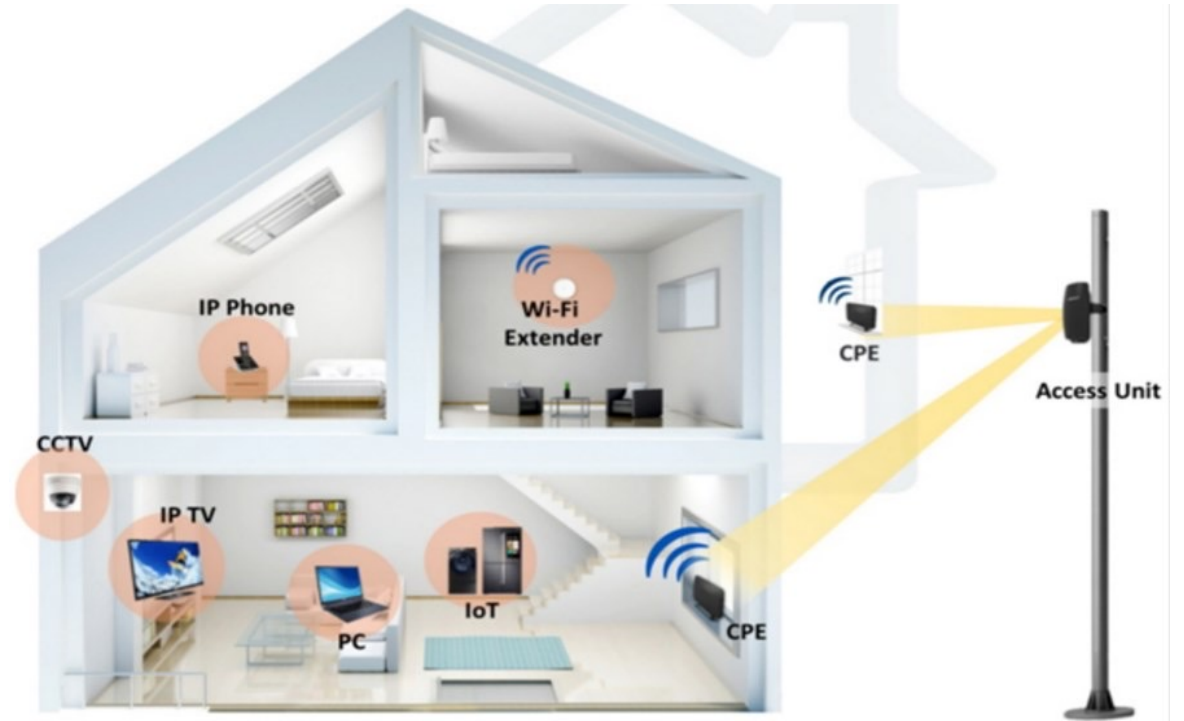
mmwave CPE

- Works upto a distance of 5Km from BTS
- Throughputs upto 2.5Gbps/CPE
- Requires LOS deployment
- Ideal for high density and semi urban deployments.

Deployment scenario-1 in Rural Setting



Deployment scenario-2 in Urban area

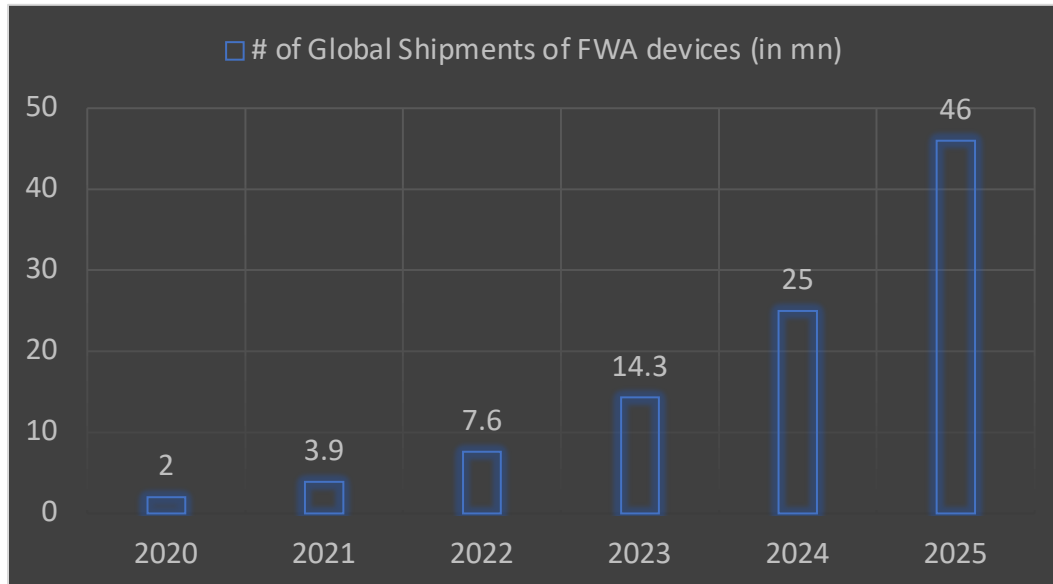


Advantages over Conventional Solution

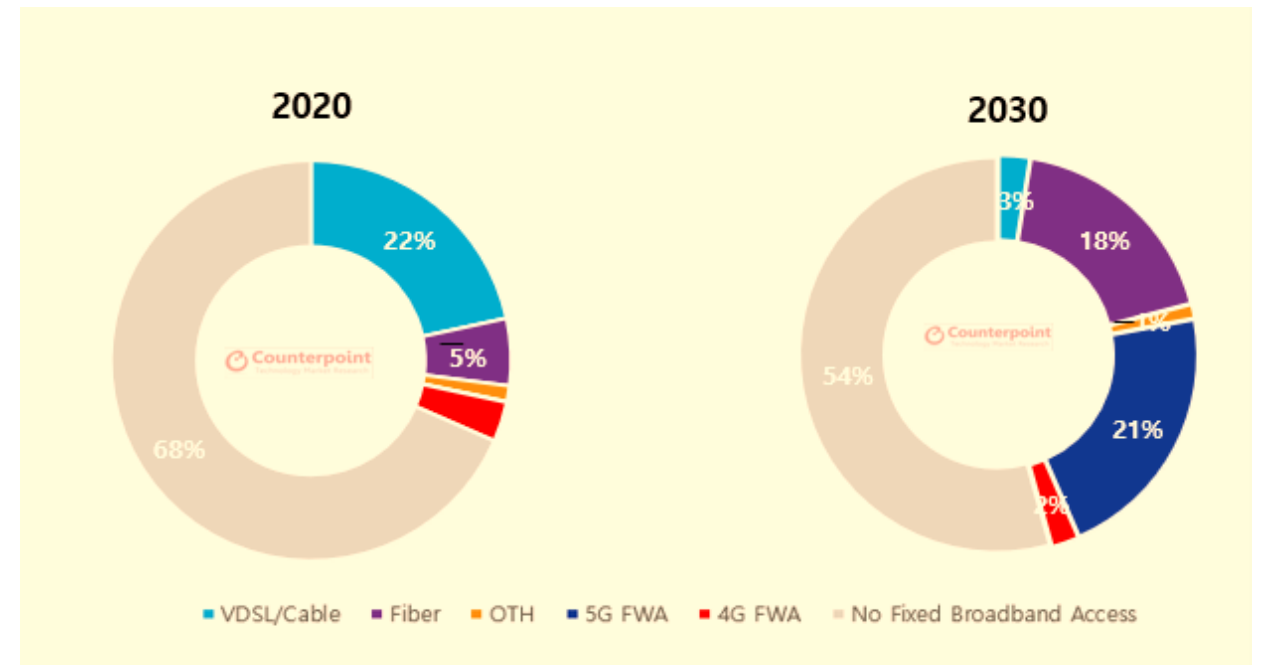
- Compared to fiber-to-the-home (FTTH) and other wireline solutions, FWA offers a variety of benefits such as:
 - Lower Rollout Costs,
 - Lower OPEX
 - No ROW issues
 - Mass deployment can be done in a very short span of time.

Demand Estimation

5G Fixed Wireless Access Market (FWA) was valued at US\$ 1.4 Bn in 2021 and is expected to reach US\$ 193.07 Bn by 2027, at a CAGR of 93.50% during a forecast period.



Global (Except China) Fixed Broadband Penetration and Share



Global Trends in FWA

- More than 100 Million deployments globally
- 5G-enabled (FWA) broadband subscriptions to cross 500 million by 2030
- available in more than 70 countries.
- service offered by more than 175 telcos.



Community Service Center



Homes



SCHOOL

Hospital



Village Bank



ATM



Remote Industry



5G powered Wi-Fi Hotspot