

NG-PtMP, Inspire Microwave Transmission with 5G Technologies



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Security Level:



Content

- Microwave Transmission Trends & challenges
- NG-PtMP, Inspire Microwave with 5G Technologies
- All Scenario Application

5G Gear Up, Microwave Facing More Pressures

Wireless evolution: 5G gear up

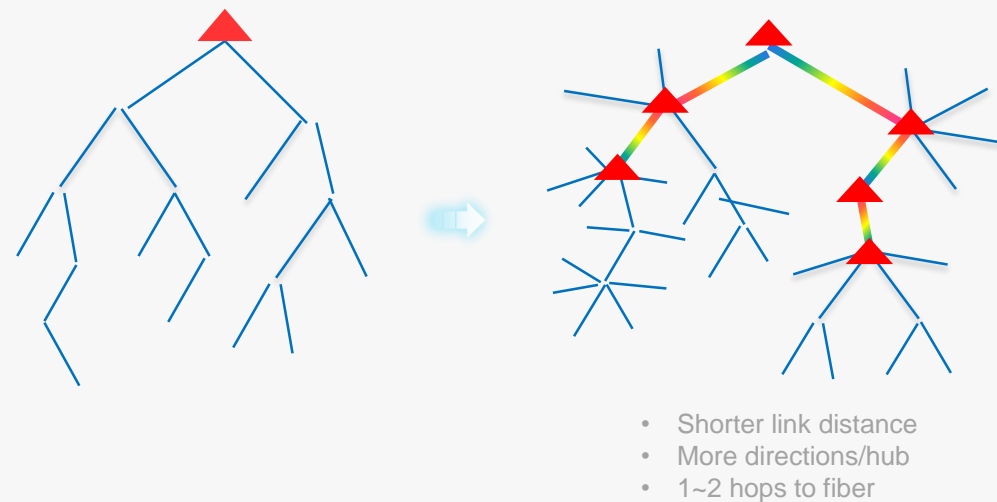
Wireless Site Capacity Forecast

Scenario	Distance	4G	5G Initial	5G Mature
Urban	<2Km	350Mbps	2Gbps	10Gbps
Suburb	2-7Km	250Mbps	1Gbps	4Gbps
Rural	> 7Km	100Mbps	500Mbps	2Gbps

* From Huawei Research Institute working with European Tier operators' capacity prediction

10x traffic growth in future years.

Network topology: tree-like to star-like



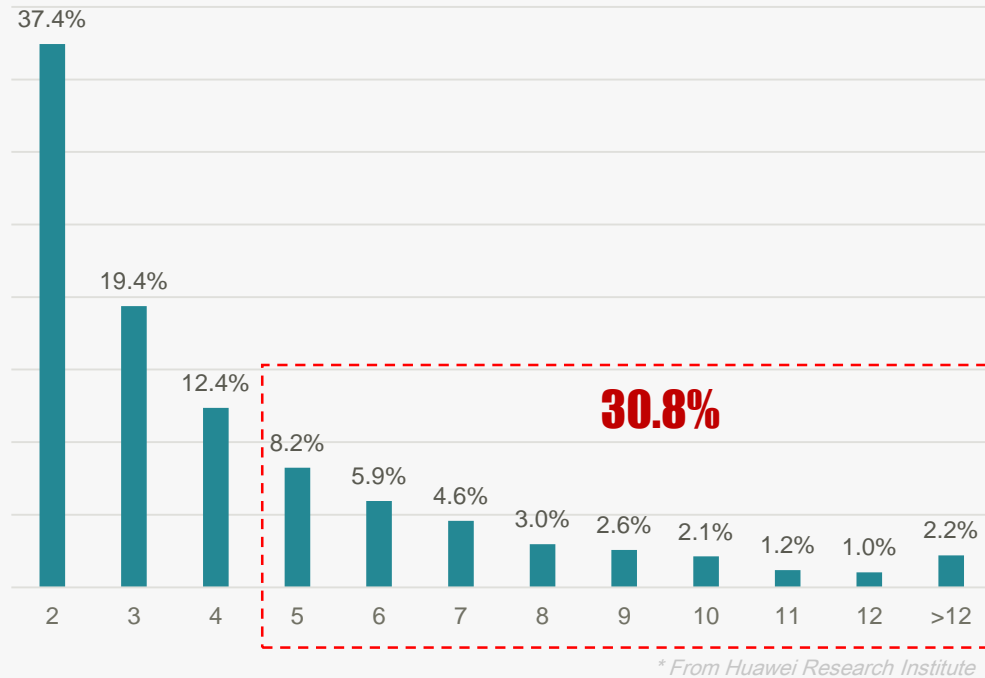
Now: tree-like

Future: star-like

Fiber extending to edge, more star-like hub sites appears

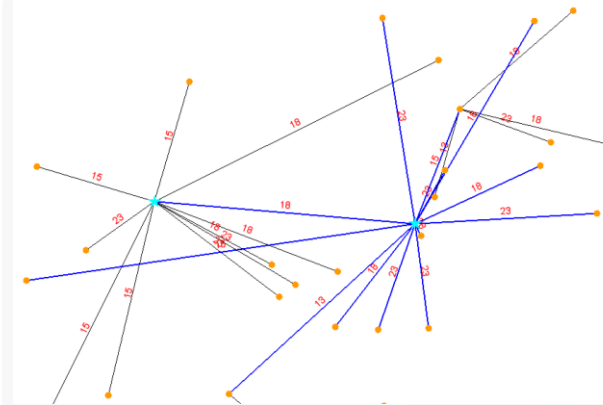
Challenges on Hub Site: Frequency Bands, On-tower Space/load

Hub site distribution by direction number



Averagely, 30.8% of hub sites have ≥ 5 directions. This number will be higher in 5G era.

Analysis of a real case



Link ID	Antenna Dia.(m)	Distance (km)	Frequency (G)	Bandwidth (MHz)
1	0.3	0.9	15	28
2	0.3	0.4	23	28
3	0.3	1.7	18	28
4	0.3	1.0	18	14
5	0.3	1.2	23	28
6	0.3	0.1	38	28
7	0.3	0.8	23	28
8	0.3	0.8	23	14
9	0.3	0.9	18	28
10	0.3	1.8	13	28
11	0.6	2.7	15	28
12	0.3	1.8	18	28
13	0.3	1.5	23	28

A real hub site with 13 directions

1 Challenge 1: frequency bands
13 Frequency bands, 336 MHz in total

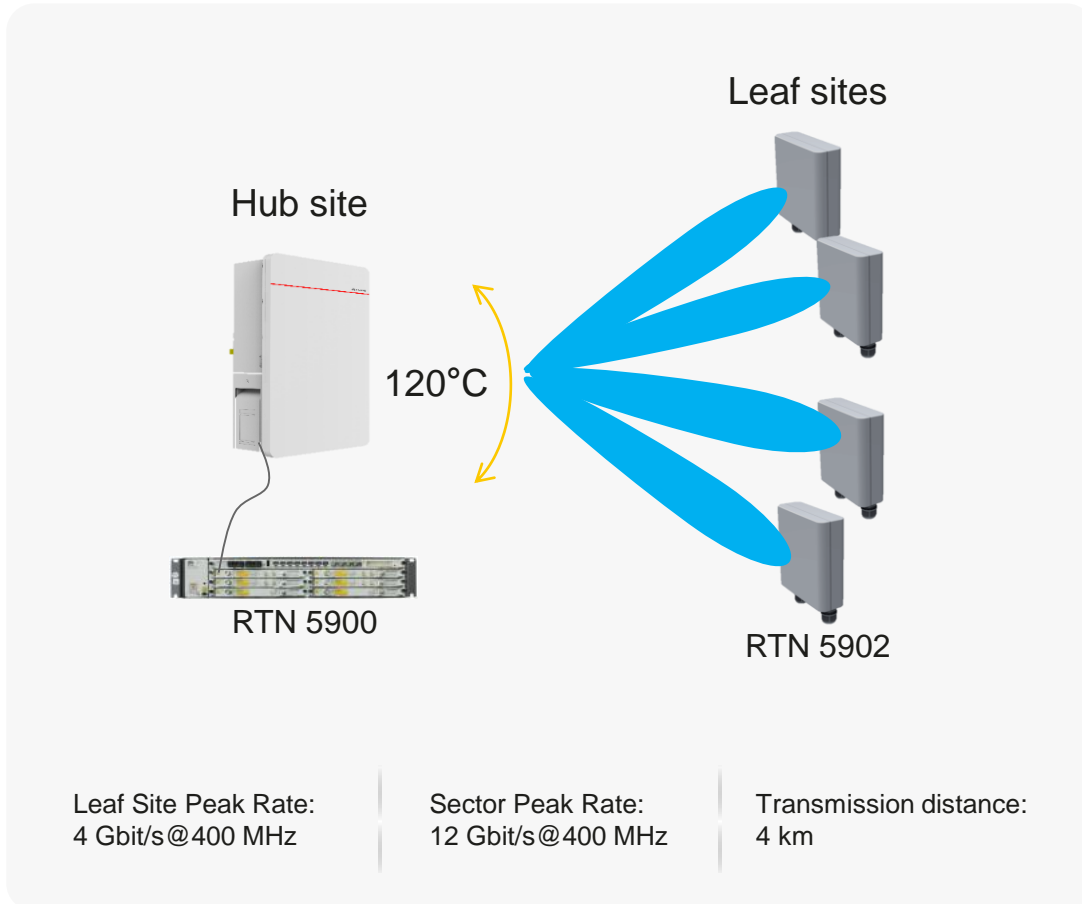
2 Challenge 2: on-tower space/load
13 antennas, 13 ODUs, ~130 KG on-tower

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Huawei Innovative NG-PtMP: Microwave with 5G Technologies

NG-PtMP Microwave Introducing 5G technologies: **Massive MIMO and beamforming**



Main specifications*

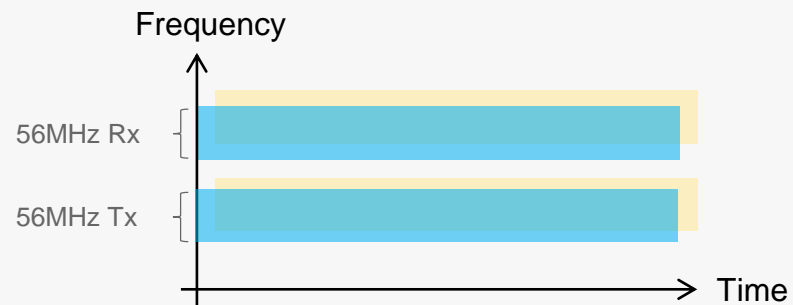
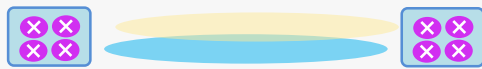
Specs	RTN 5900 (Hub)	RTN 5902 (leaf)
Frequency Bands	26/28 GHz	
Channel Bandwidth**	ETSI: 28/56/112 MHz 3GPP: 100/200/400 MHz	
Air capacity**	12Gbps @400MHz 3Gbps@112MHz	4Gbps@400MHz 1G@112M
Transmission Distance	<4Km	
Beam Steering Range (°)	60/90/120	-
Number of Leaf	Backhaul Mode: 8 EPL Mode: 30	-
Service Interfaces	2*25GE/10GE opt.	TBD
Highest Modulation Scheme	256QAM	
TRx	8T8R	2T2R
Duplex Technology	TDD (DL:UL = 4:1)	
Antenna Gain	27 dBi (1 stream)	34 dBi (1 stream)
Dimension (H*W*D, mm)	AAU: 585*300*120	TBD
Weight (Kg)	TBD	TBD

*NG-PTMP is still under development. All specifications above listed are subject to change without notice.

**112MHz/400MHz will be hardware ready, but not supported in 1st release.

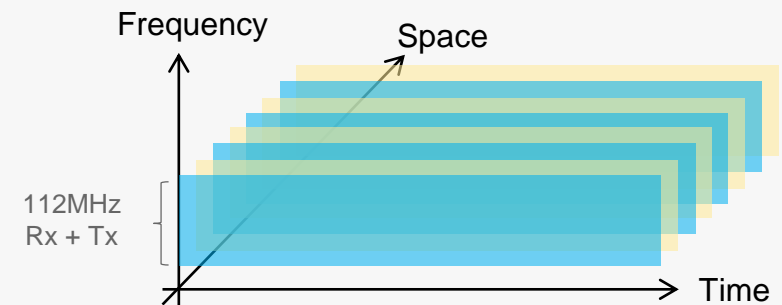
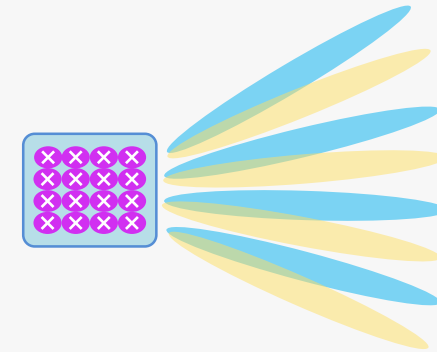
Key Technology 1 – Massive MIMO: **3x** Spectrum Efficiency Improvement

PtP Microwave: 2T2R (XPIC)



1Gbps@56MHz channel

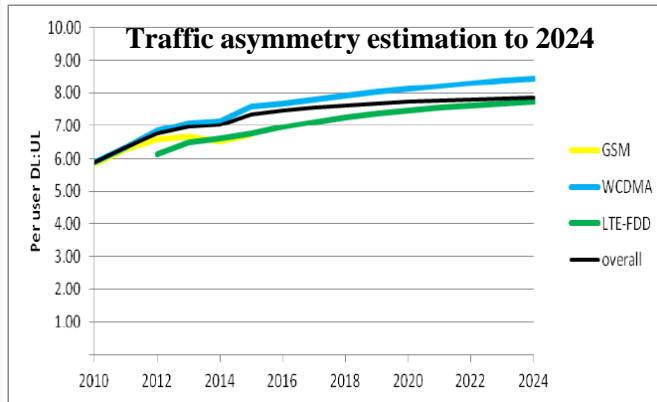
NG-PtMP: 8T8R



3Gbps@112MHz channel

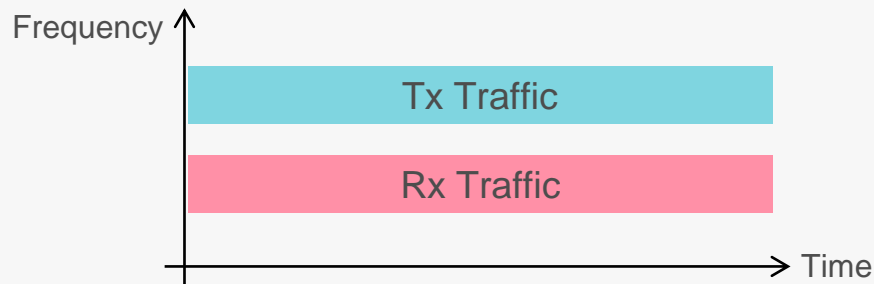
Key Technology 2 – TDD/TDMA: Higher Capacity Usage Efficiency

PtP Microwave: FDD Based



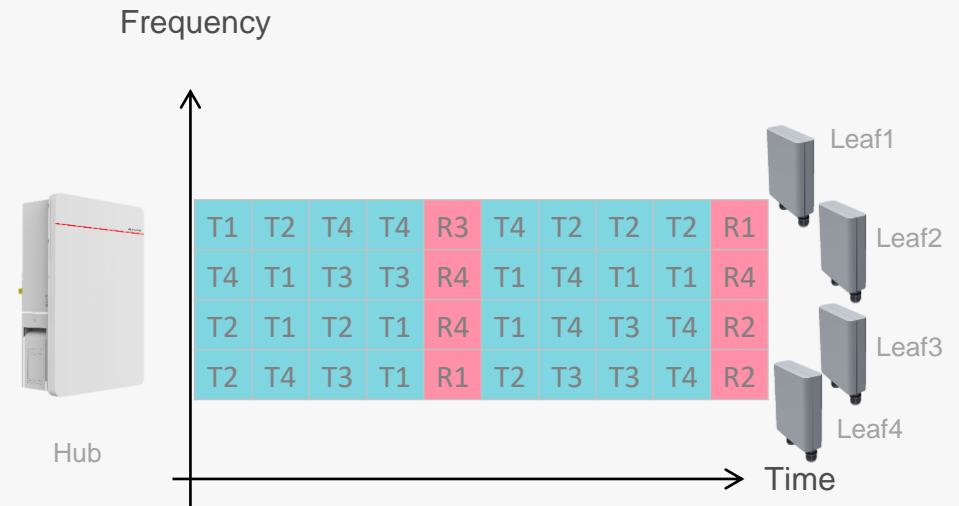
Mobile traffic is **asymmetric**. DL:UL is around 7~8

** Source: Report ITU-R M.2370-0,*



FDD based PtP microwave has **Symmetric** architecture. most of UL capacity are wasted.

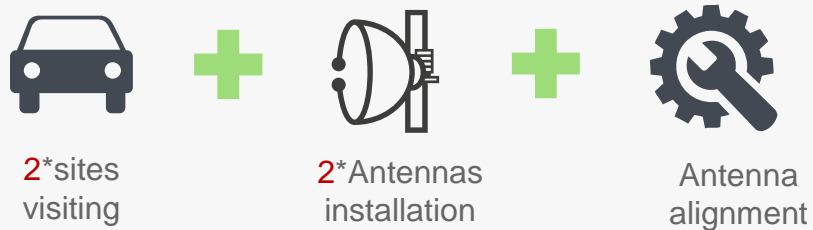
NG-PtMP Microwave: TDD/TDMA Based



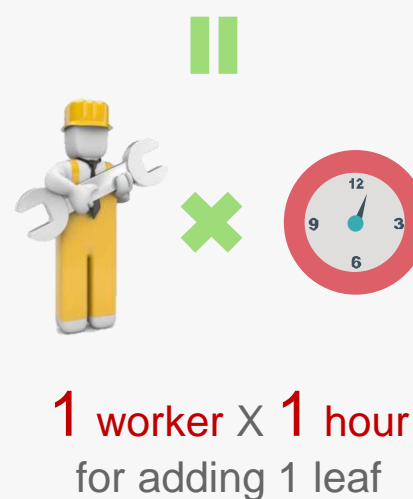
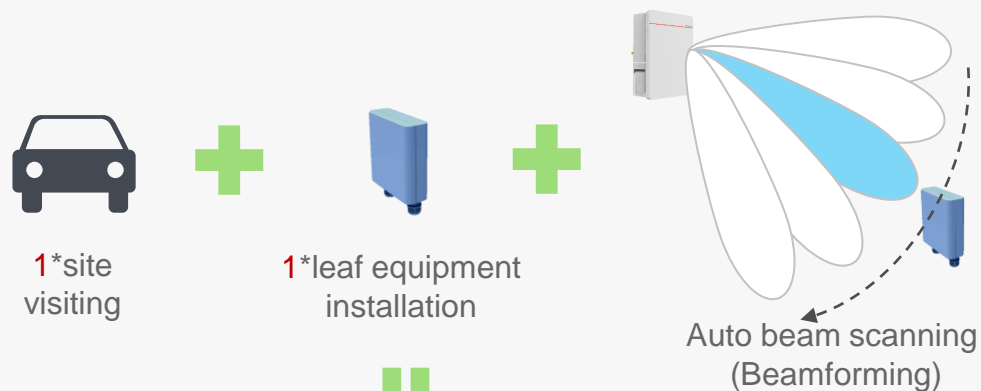
- TDD: Asymmetric architecture, **Tx & Rx decoupled**, more capacity used for DL traffic.
- TDMA: Multiple leaves can share one beam. **Dynamic capacity allocation** among leaves intra beam

Key Technology 3 – Beamforming: Simplify Antenna Deployment

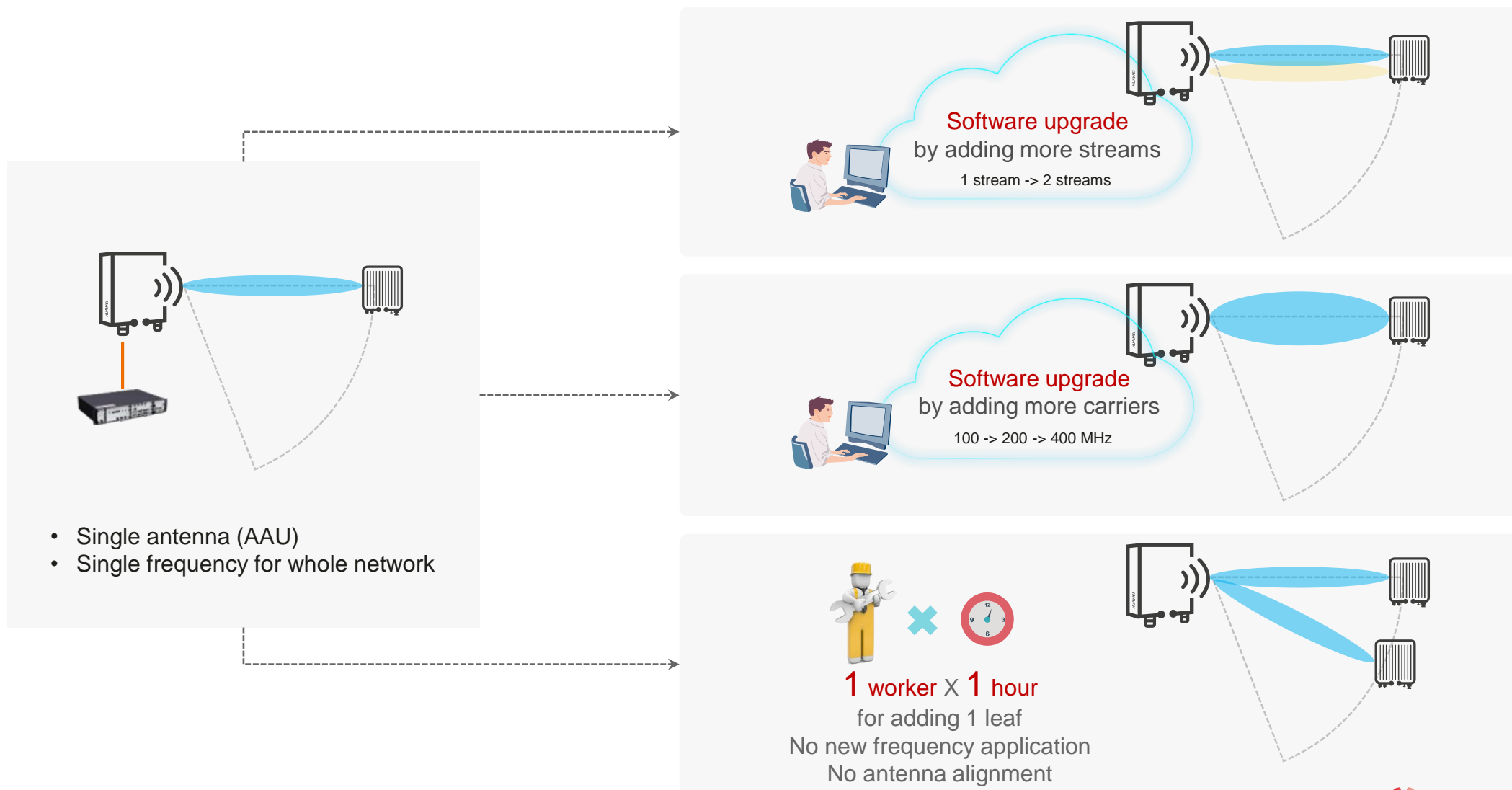
PtP Microwave



NG-PtMP



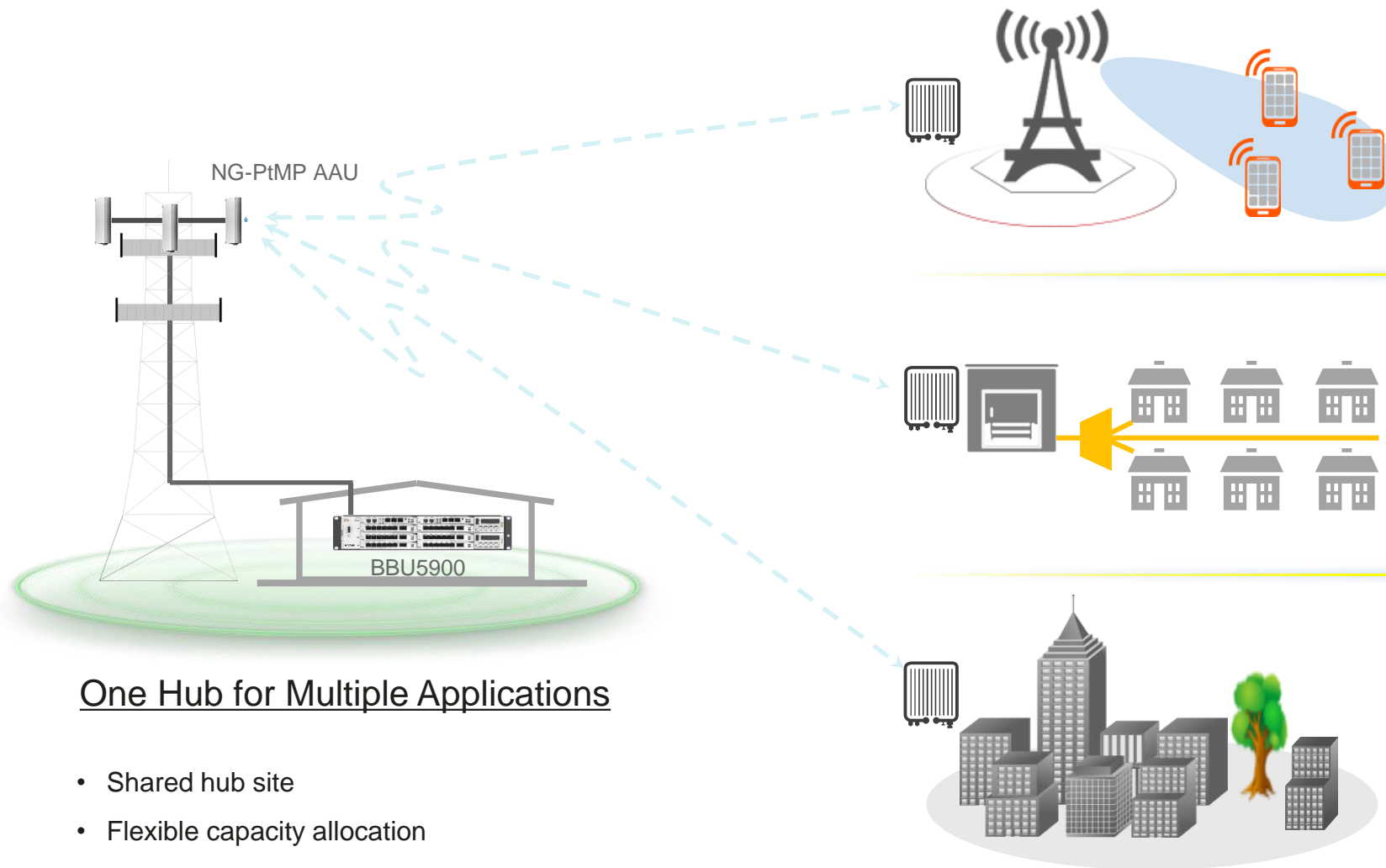
Single antenna + single frequency: Flexible Expansion



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All Scenario Application, Flexible Capacity Allocation



MBB Backhaul

- Solve hub site challenges: frequency bands, on-tower space

FBB Backhaul

- Rapid subscriber development

Enterprise Private Line

- Higher capacity
- Fast service provisioning

One Hub for Multiple Applications

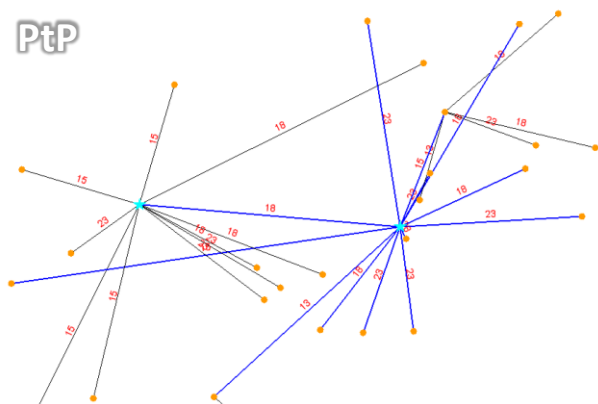
- Shared hub site
- Flexible capacity allocation

NG-PtMP as MBB Backhaul: Saving Frequency and on-tower Space for Hub Site

Re-design hub site with NG-PtMP

PtP vs. PtMP

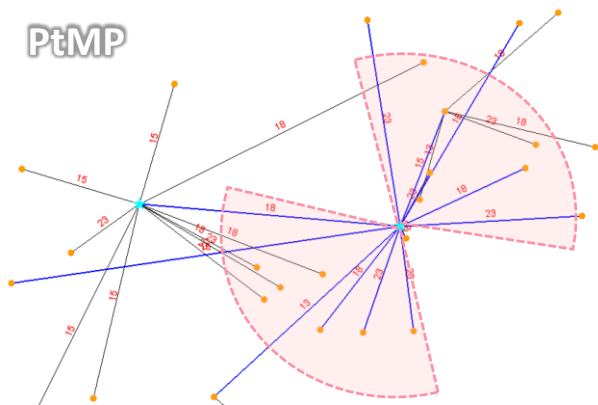
PtP



Link ID	Antenna Dia.(m)	Capacity (Mbps)	Frequency (G)	Bandwidth (MHz)
1	0.3	250	15	28
2	0.3	250	23	28
3	0.3	250	18	28
4	0.3	125	18	14
5	0.3	250	23	28
6	0.3	250	38	28
7	0.3	250	23	28
8	0.3	125	23	14
9	0.3	250	18	28
10	0.3	250	13	28
11	0.6	250	15	28
12	0.3	250	18	28
13	0.3	250	23	28

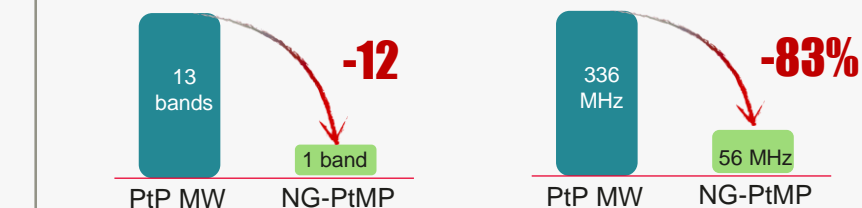
VS.

PtMP

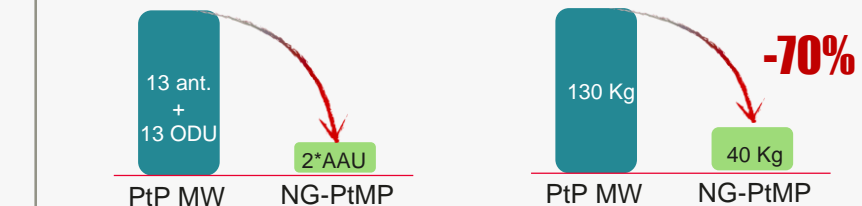


- 2*AAU, each for 120° coverage
- Same frequency band for 2 cells
- Capacity per leaf:
 - ~250Mbps@56MHz
 - ~500Mbps@100MHz
 - ~1Gbps@200MHz
 - ~2Gbps@400MHz

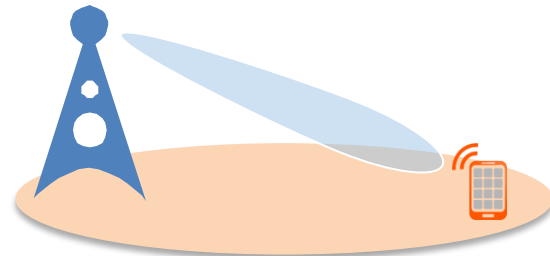
1 Frequency bands saving



2 On-tower space saving



NG-PtMP as FBB Backhaul: Fast FBB Subs Development



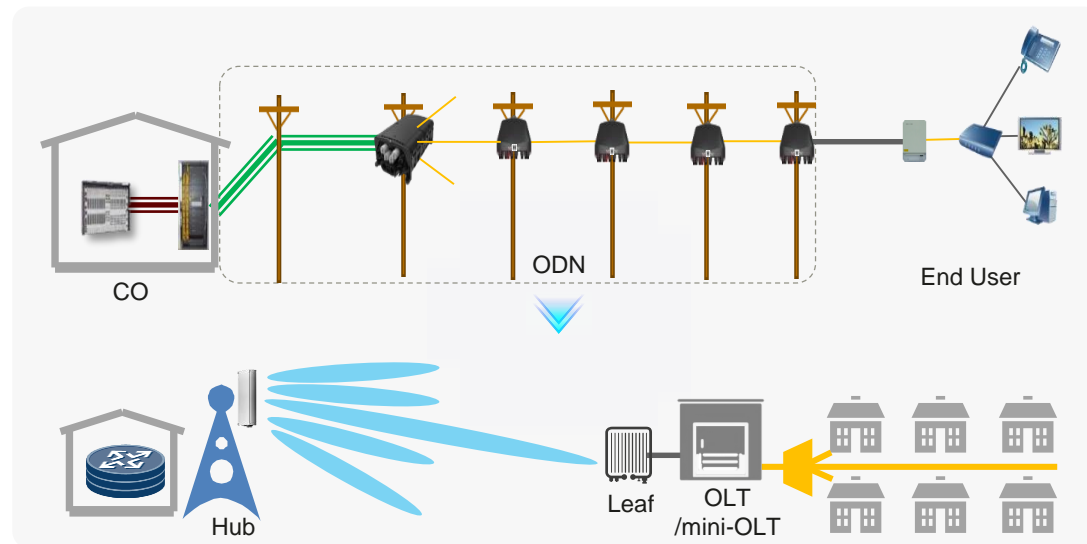
Existing BS for MBB



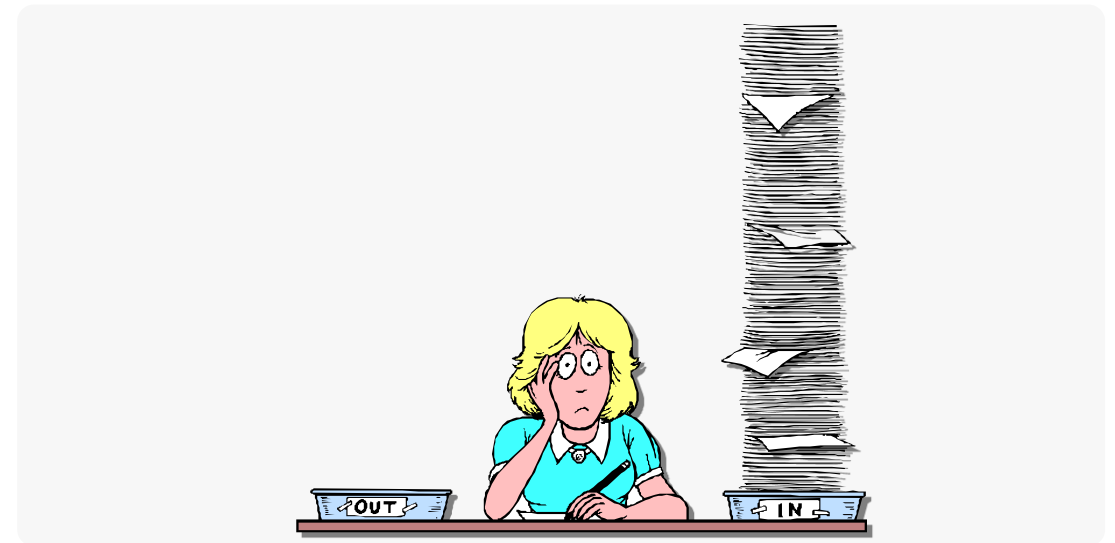
Fast FBB Subs Development

- Adding NG-PtMP AAU
- Adding boards in BBU
- Adding Leaf on-demand
- Re-use BS and site infra.

Vs. FTTx: no fiber laying, no ODN deployment



Vs. PtP MW: no new frequency application & planning

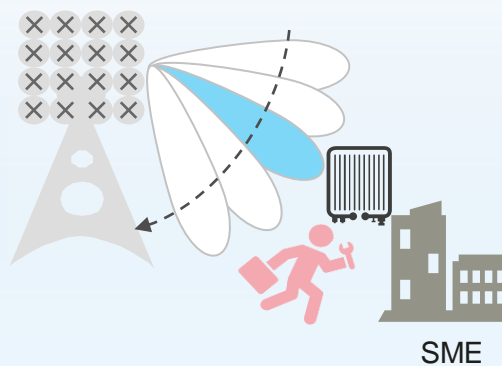


NG-PtMP as EPL: Fast Service Provisioning

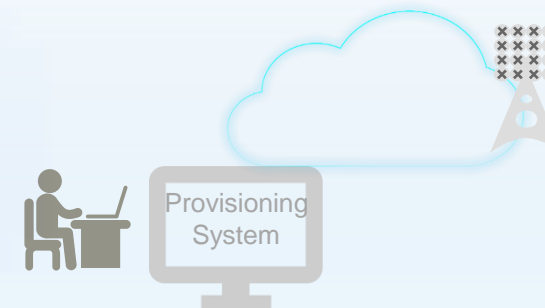
Step 1: deploy hub in valued area



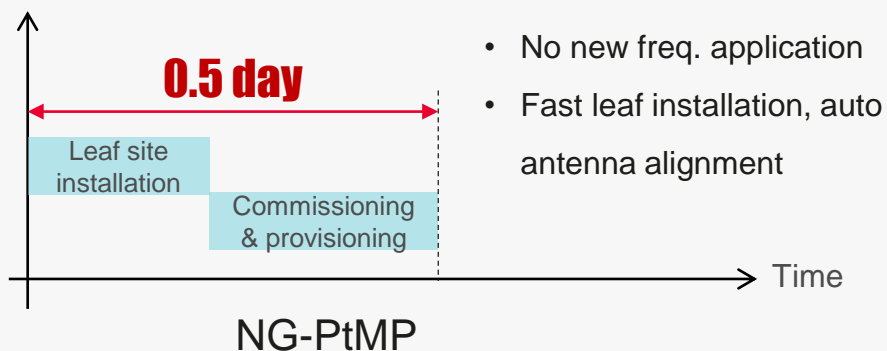
Step 2: install Leaf on-demand



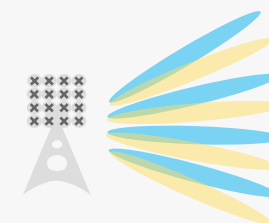
Step 3: fast service provisioning



Vs. PtP MW: shorter TTM



Vs. Traditional PtMP MW: higher capacity



NG-PtMP: 8T8R

~3Gbps@112MHz

VS.

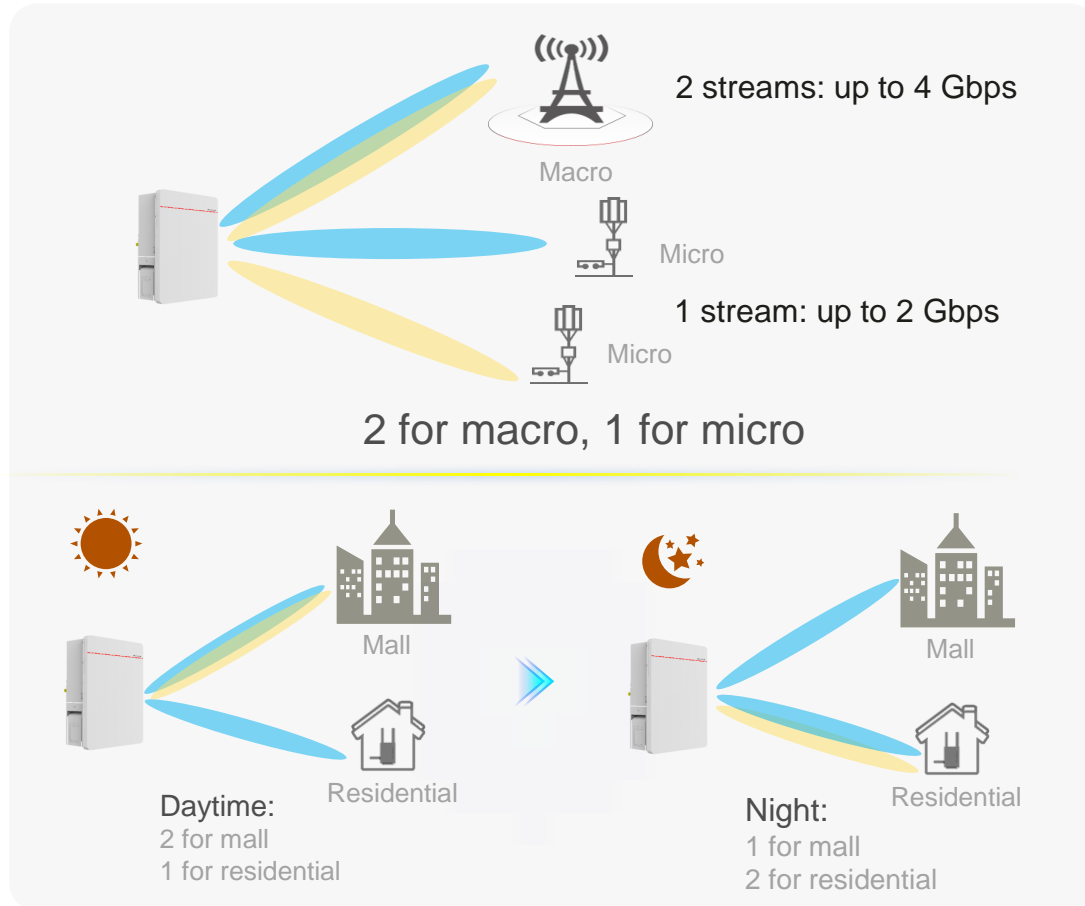


Traditional PtMP: 1T1R

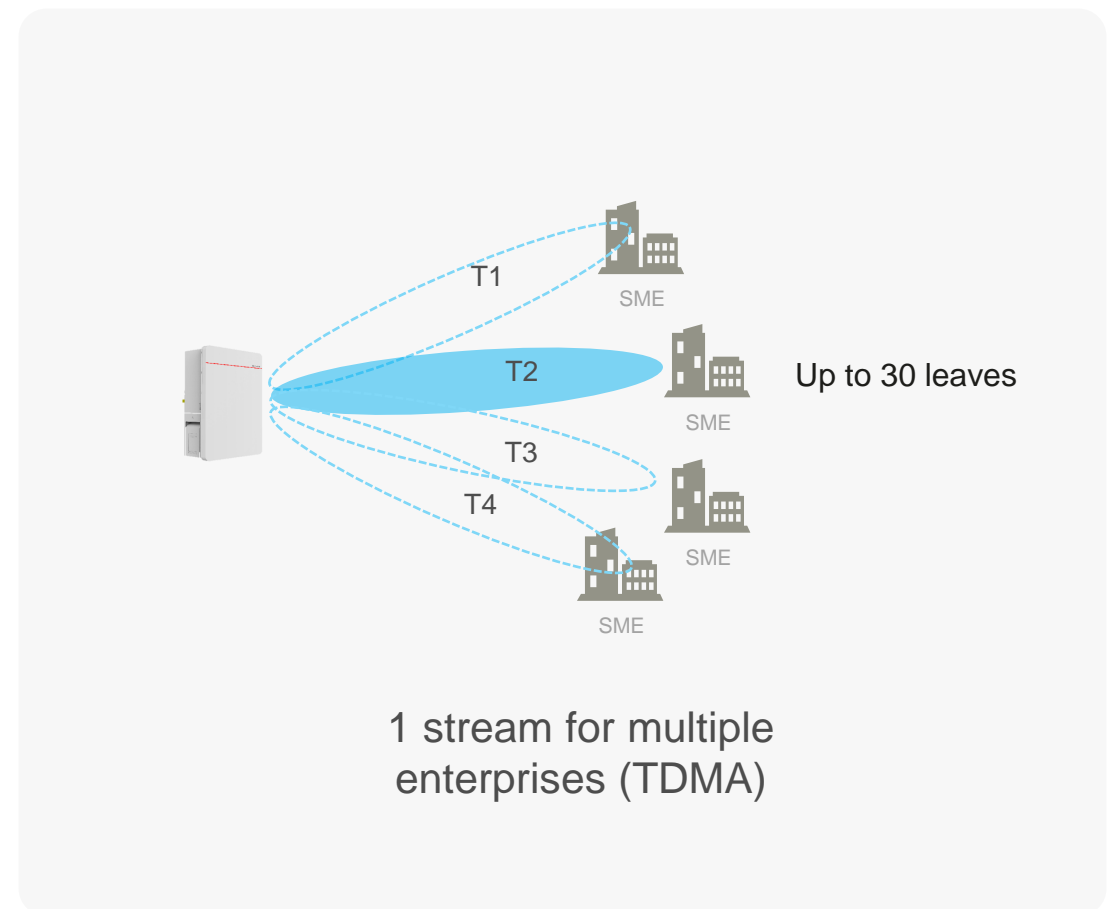
<1Gbps@112MHz

Mixed Scenario: Flexible Capacity Allocation

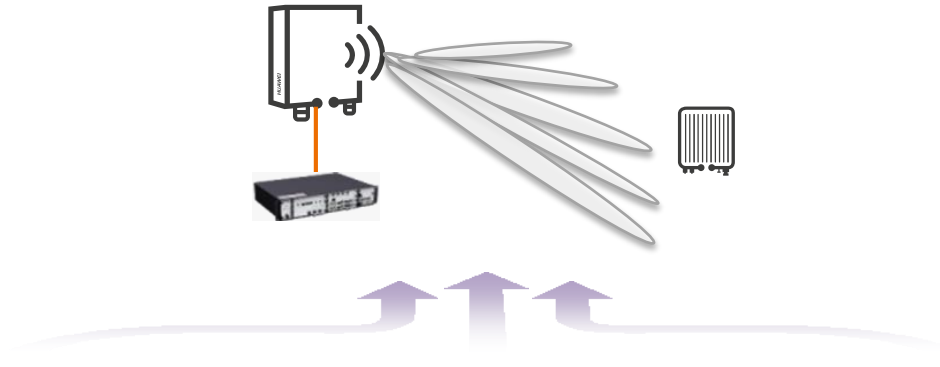
Flexible capacity allocation inter-beam



Flexible capacity allocation intra-beam



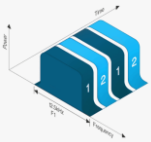
Summary: Key Value of NG-PtMP



Massive MIMO: 8T8R, 3x spectrum efficiency improvement



Beamforming: auto antenna-alignment, fast deployment



TDD/TDMA: Tx & Rx decoupling, flexible capacity allocation

Powered by 5G Technologies



MBB BH: frequency bands saving, on-tower space saving



FBB BH: fast service development



EPL: high capacity, fast service provisioning

Multiple Applications

Thank you.

Bring digital to every person, home and organization for a fully connected, intelligent world.

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