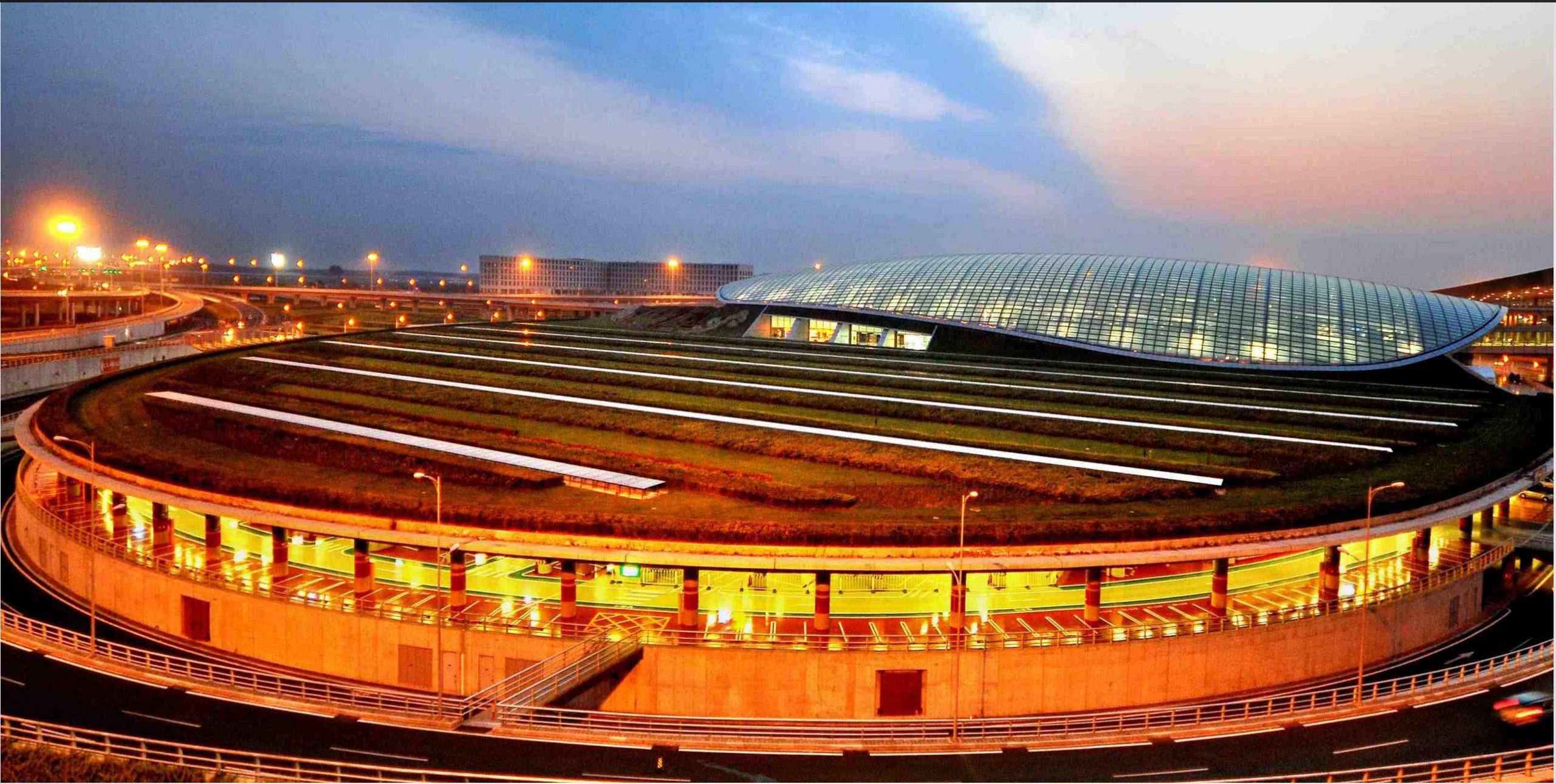


Airport Digital Indoor Coverage Solution-- **LampSite**



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5 Reasons, Why Beijing Airport Choose LampSite

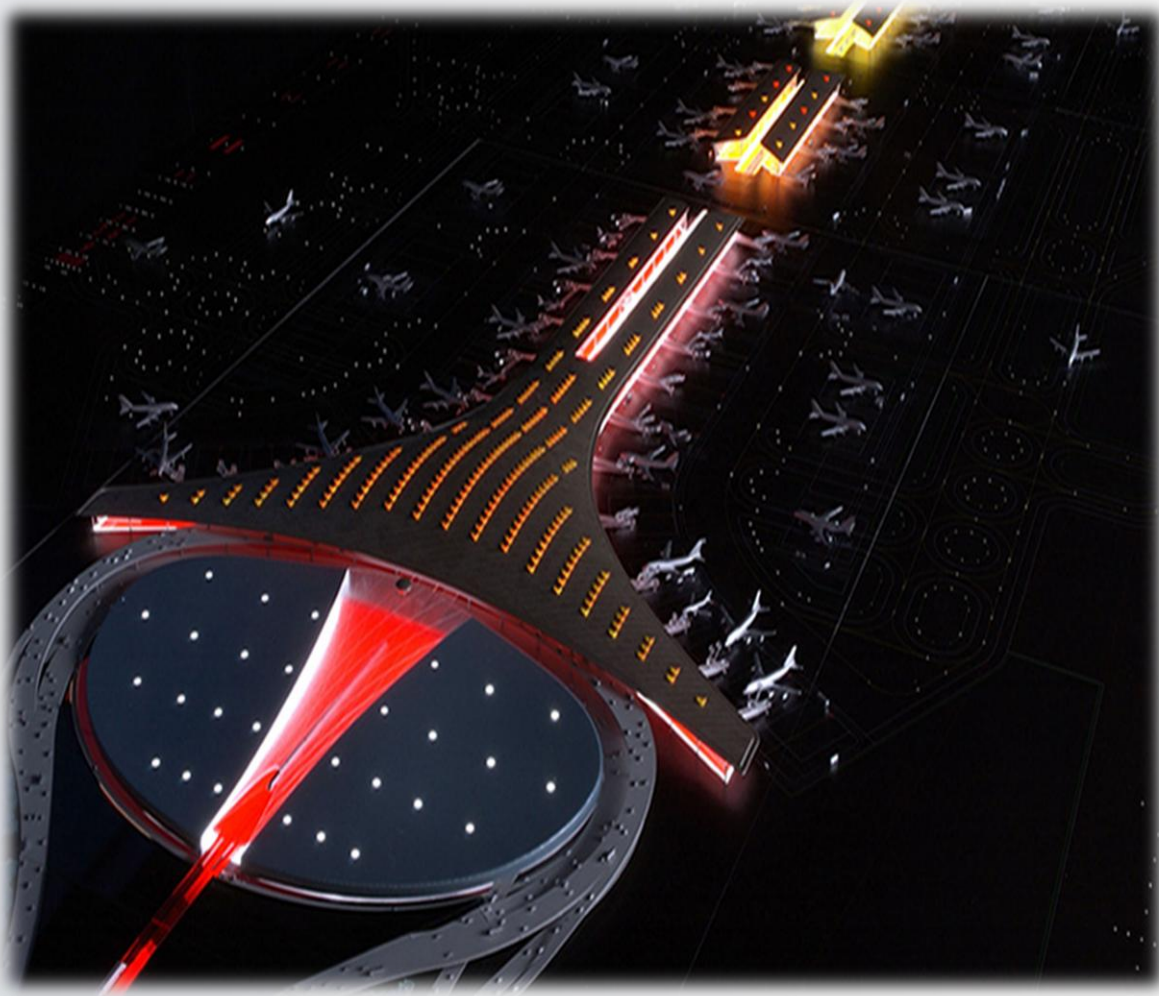
2

Beijing Airport LampSite Solution Introduction

3

Highlights of LampSite in Beijing Airport

Reason1 : Beijing airport is the largest airport in China, which is one of the important landmarks in Beijing, it also is an important brand for operators, user experience is essential



Area : **1.4M m²**

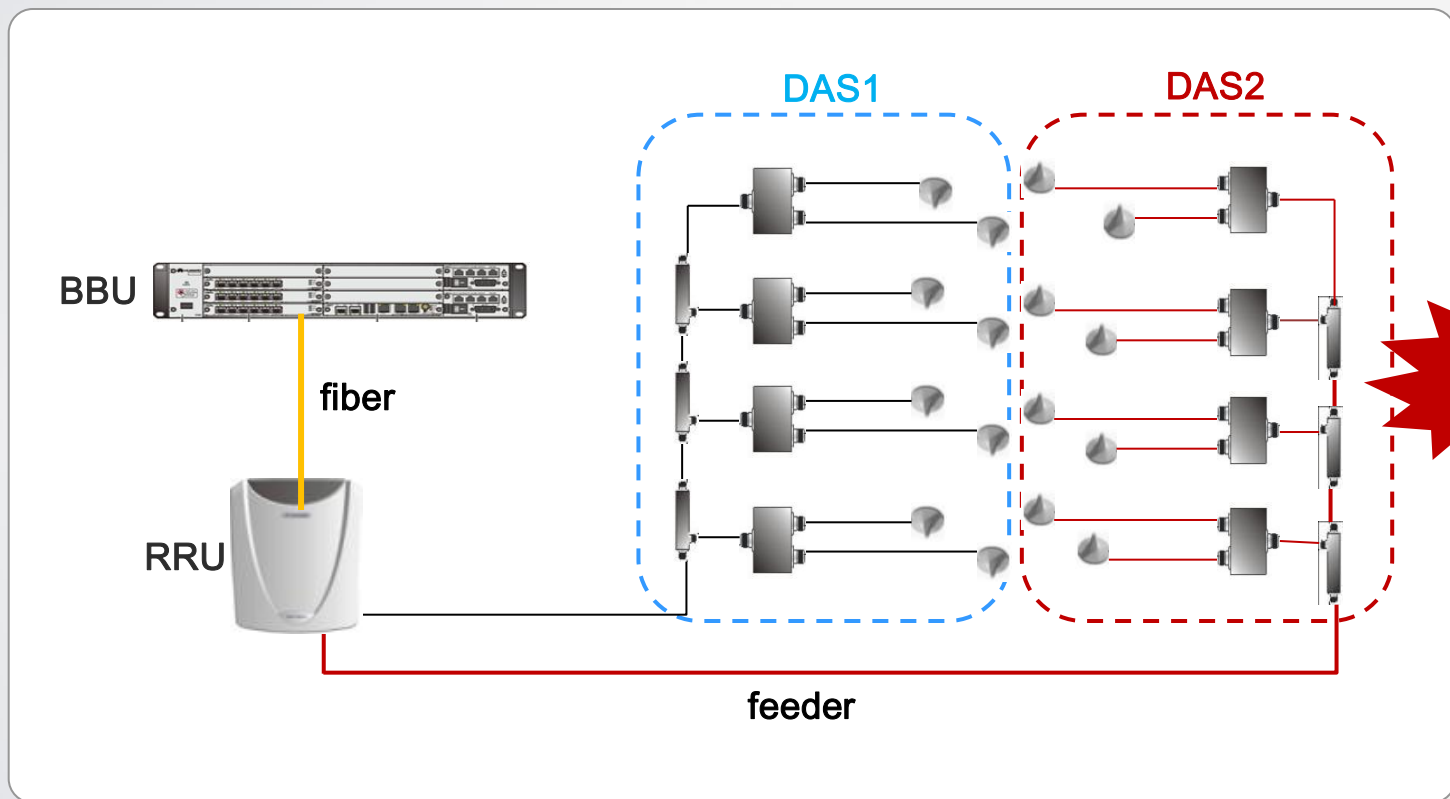
Passengers : **80M /year**

LTE MIMO is Must

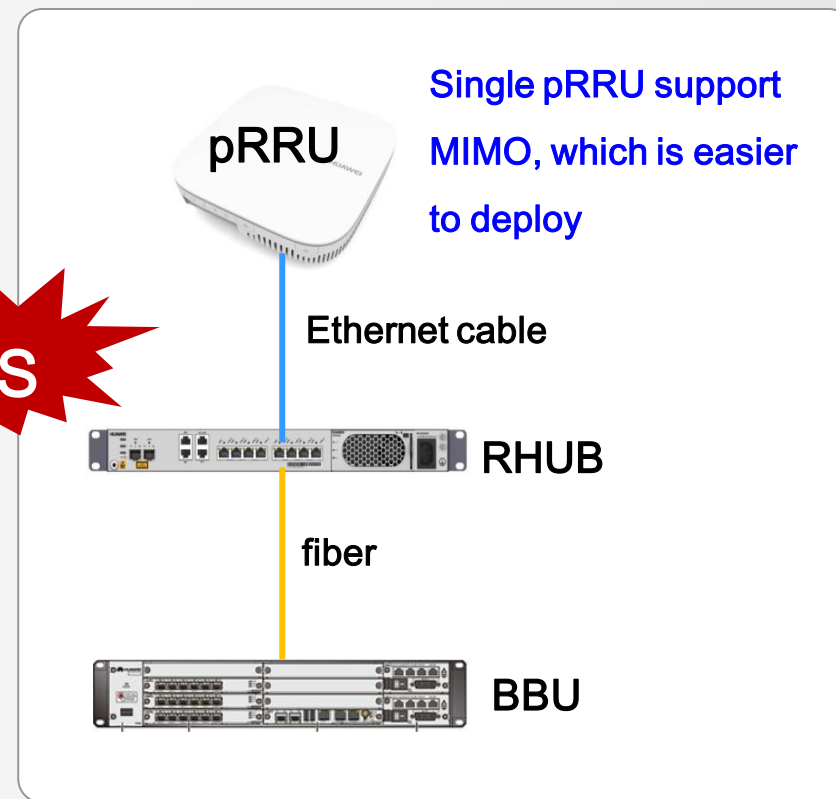
Reason2 : Traditional solution need 2 DAS to support LTE MIMO, which is hard to deploy



Traditional DAS



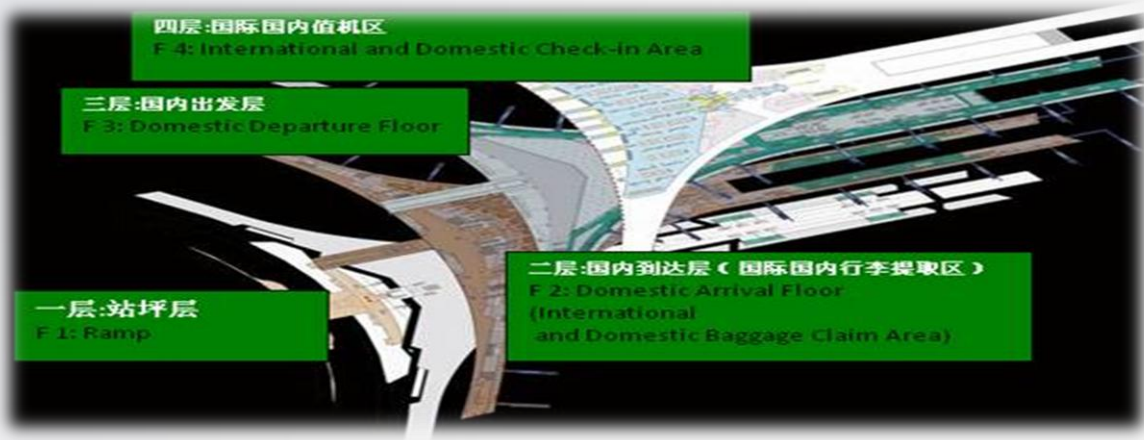
LampSite



Reason3 : Special projects, more limitation of construction, construction period is not controllable, the DAS LTE performance is more uncontrollable

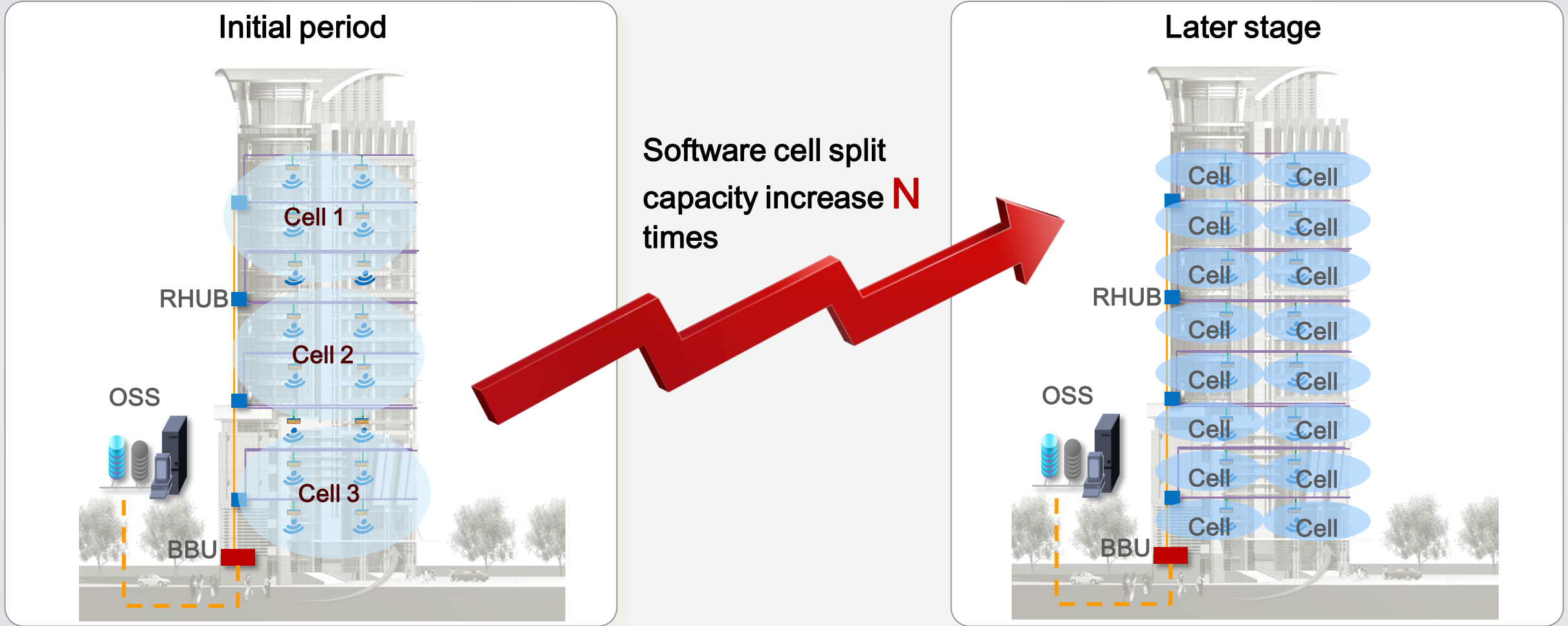


Internal and external structure is very complex

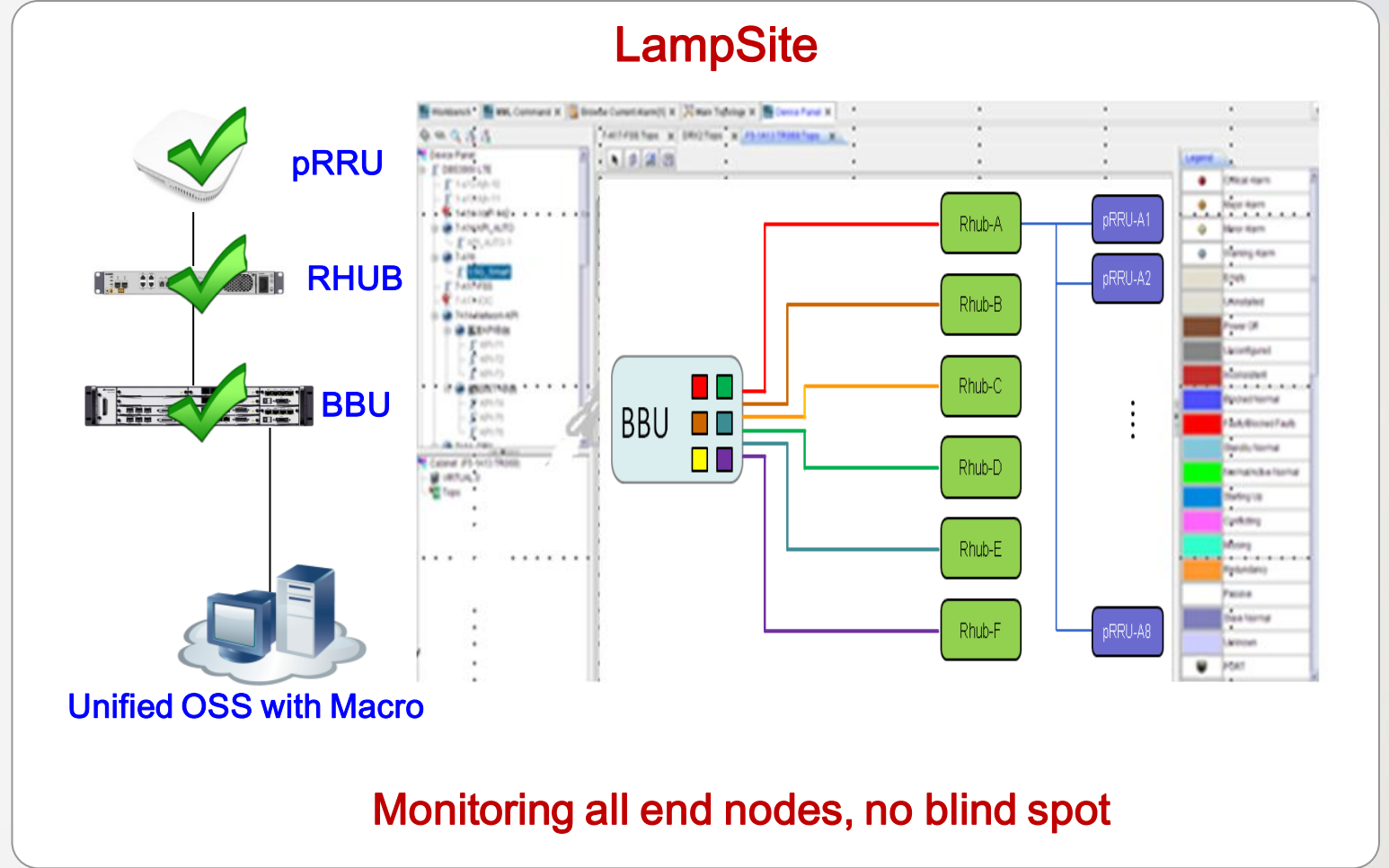
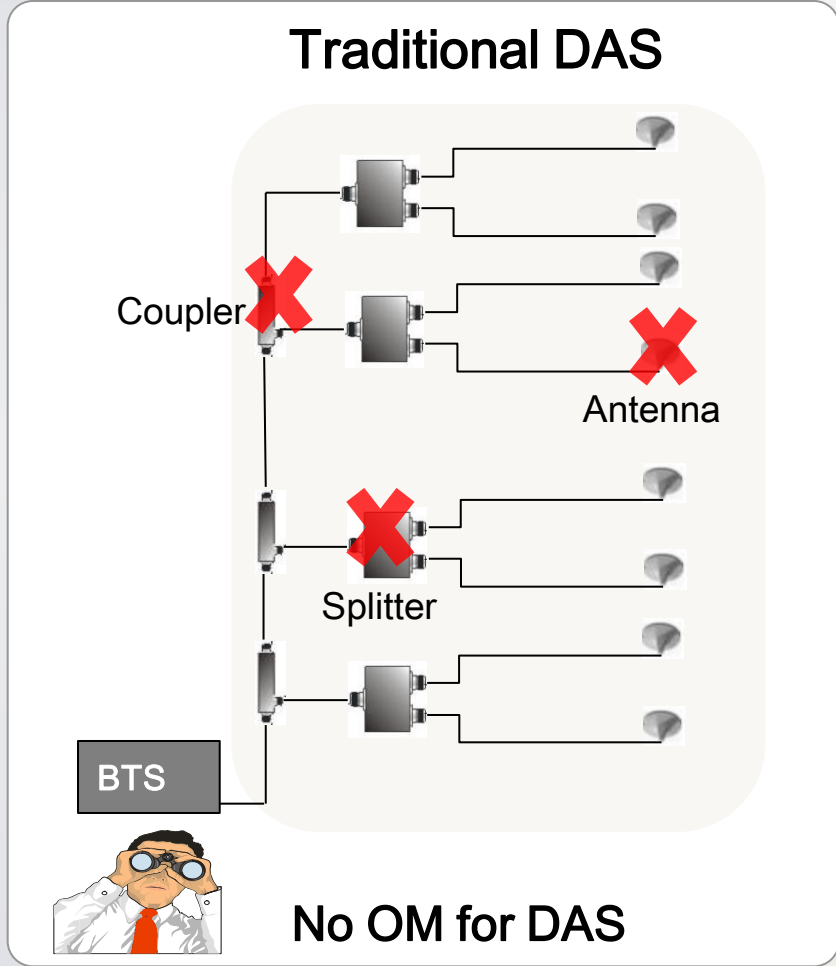


- Sensitivity scenarios , airport property have more restrictions and requirements on the device configuration, installation location, routing, security performance and other aspects
- The existing DAS system is embedded in the building, it is difficult to build another new DAS system for MIMO, which is hard to ensure link balance and system performance

Reason4 : LampSite supports flexible capacity, one deployment support long-term capacity evolution, long-term investment protection



Reason5 : LampSite E2E Visible, Clear KPI Traffic Distribution, Easy Troubleshooting



Contents



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5 Reasons, Why Beijing Airport Choose LampSite

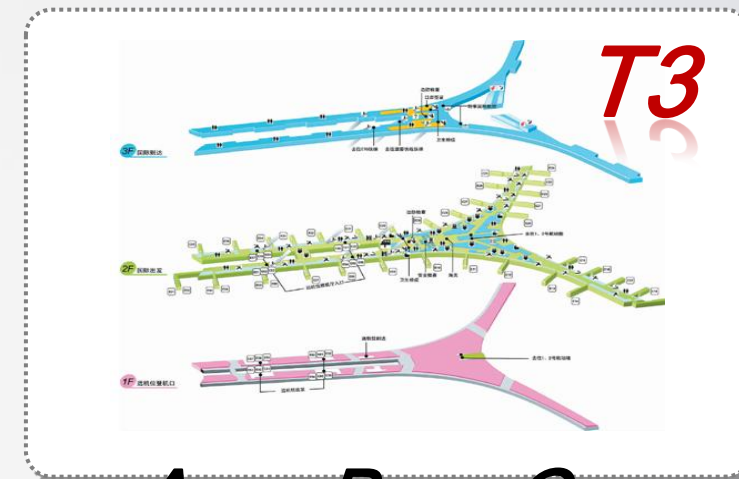
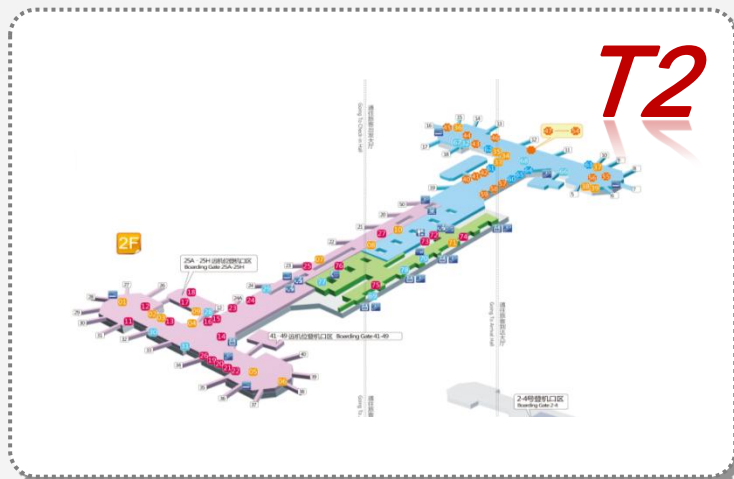
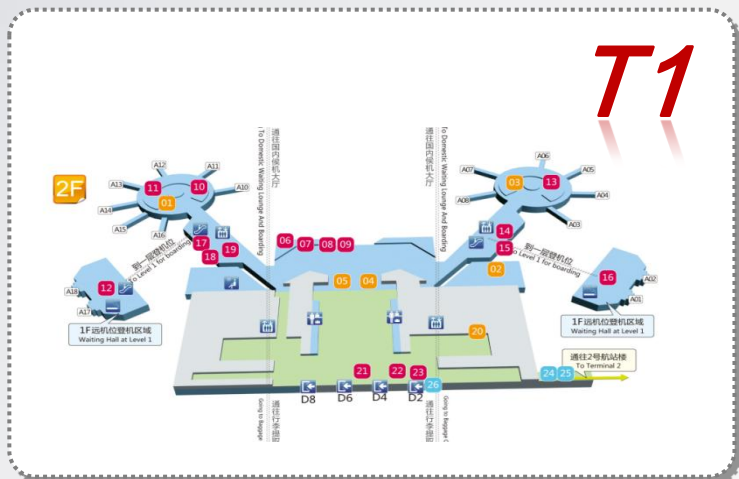
2

Beijing Airport LampSite Solution Introduction

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Highlights of LampSite in Beijing Airport

Beijing Airport LampSite network size



	T1			T2			T3		
	A area			B area			C area		
BBU	3			10			17		
RHUB	<50			<100			100+		
pRRU	100+			400+			600+		
Cells	6			21			37		

46 BBU, 2200+ pRRU, 100+ Cells

Customized design for different traffic features to guarantee coverage mean while controlling interference



- **Easy deployment :**

utilize LampSite ethernet cable deployment flexibility, deployed pRRU in the compass box, ceiling, glass walls, shops and other locations, to ensure the implementation of the project

- **Easy expansion :**

Rational use of directional antenna and pRRU physical location separation, to ensure the quality of coverage (cell splitting).

Deploy one more ethernet cable, convenient expansion, and disaster recovery

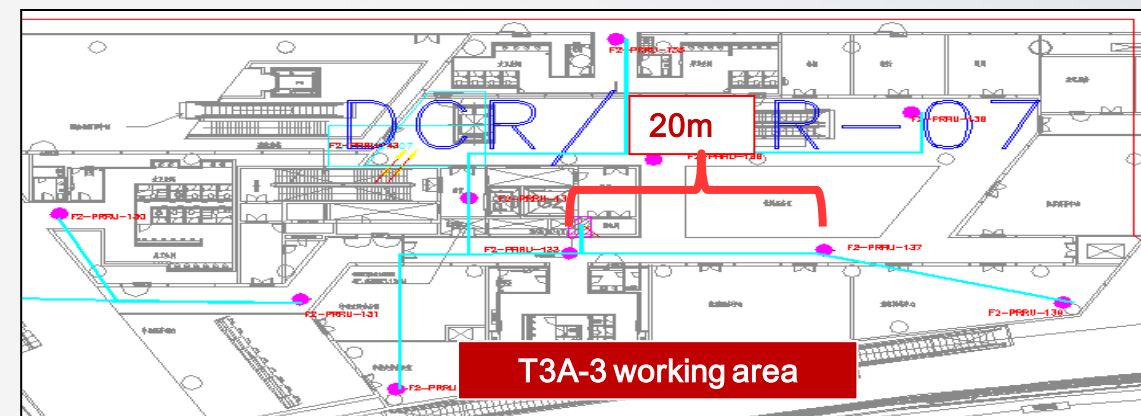
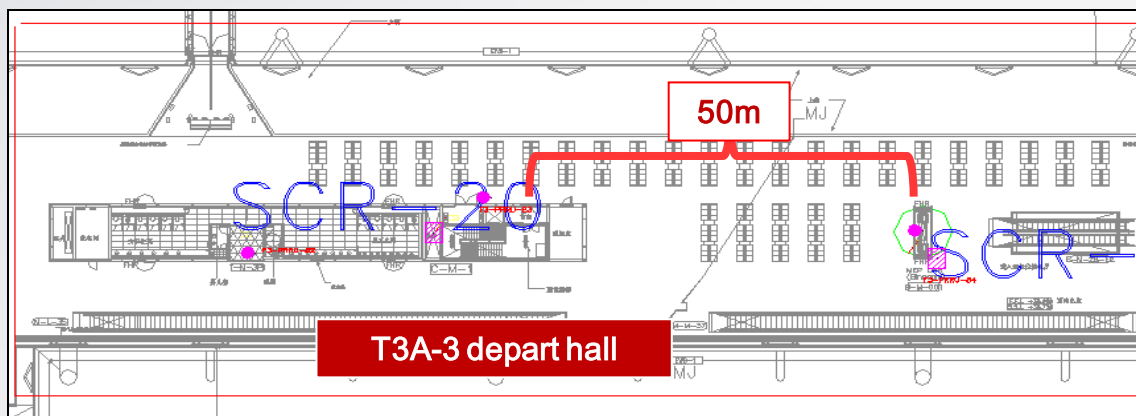
- **Reasonable coverage :**

Area type	Region definition	Coverage criteria	RSRP	RS-SINR	Cell edge rate	Single user peak throughput
			dBm	dB	Mbps	Mbps
I	Departure hall, check-in processing zone, Departure lounge, VIP terminal	High	≥-100	≥6	DL/UL : 6/2	DL/UL:150/50
II	Arrival hall, baggage claim area, shopping area, dining area, staff office	Common	≥-105	≥3	DL/UL : 4/2	
III	Airport equipment room, warehouse, basement, etc.	Low	≥-110	≥0	DL/UL : 3/2	

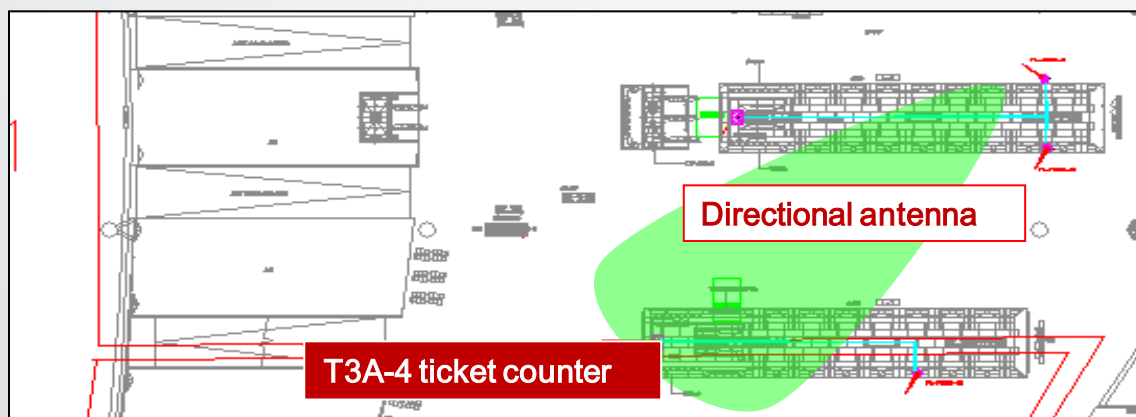
Customized design for different traffic features to guarantee coverage mean while controlling interference



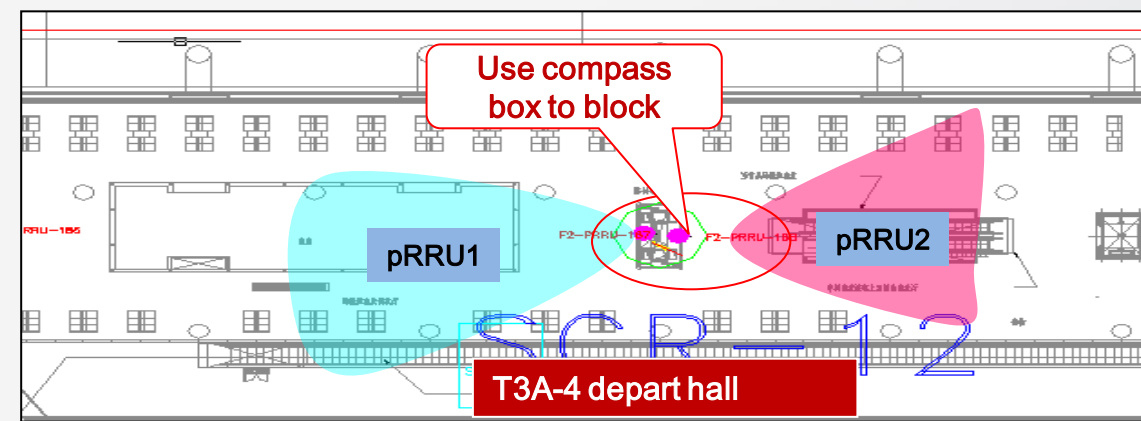
Different area planning different pRRU cover radius



Directional antenna cover, reduce interference



Reasonable design overlap coverage area, to ensure the follow-up expansion is convenient





Capacity Planning Need to Meet the Demands of Next 3~5 Years

LTE business forecast in the next 3~5 years

Input parameters	values
Airport passenger traffic volume (million)	8000
Daily busy hour traffic flow (person)	18000
Terminal penetration	30%
Total number of registered users	5400
LTE registered user scale	50%
Busy time LTE registered users	2700
Average rate of LTE users	DL/UL : 5M/2M

- Beijing airport is expected in the next 3~5 years busy hour LTE registered users to **2700** people
- According to the characteristics of the data traffic, it is expected to reach the user average rate of **downlink 5Mbps, uplink 2Mbps**

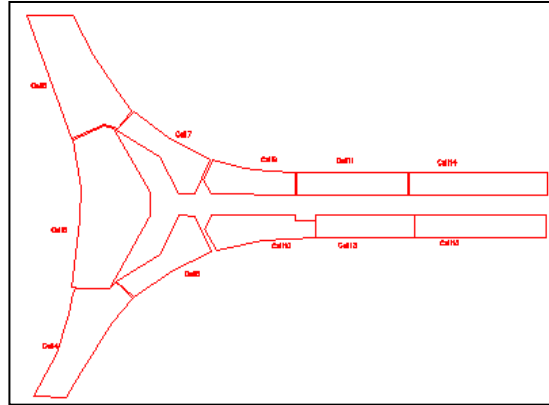
According to the LTE traffic model to design the cell number

Input parameters	values
User activation rate in busy hour	30%
Online user number in busy hour	810
DL/UL traffic duty cycle	22%/15%
LTE DL/UL scheduling user number in busy hour	179/122
DL/UL Cell average throughput (Mbps)	30M/20M
DL/UI capacity demand	895M/244M
DL/UL cell number	30/13

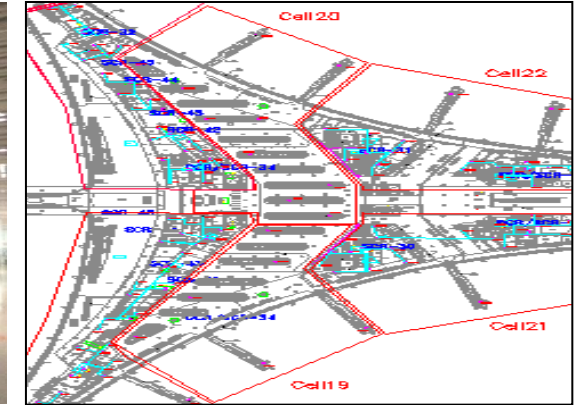
- In the next 3~5 years, Beijing airport capacity will be : **DL 895Mbps , UL 244Mbps**
- Beijing airport cell number : **DL>30 ; UL>13**

According to different area's traffic feature to plan cells

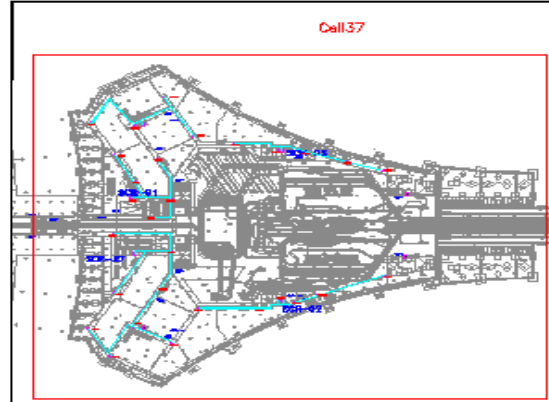
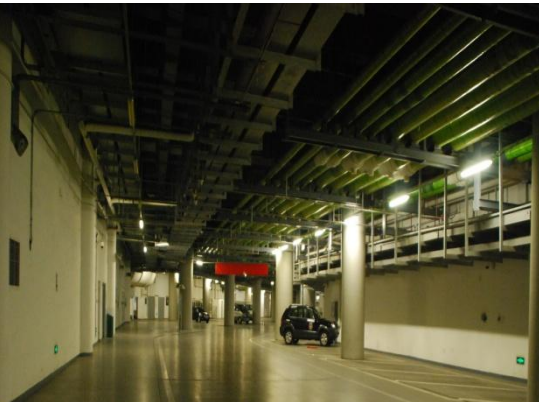
T3 A-3 departure hall : dense User , low mobility, high incidence of various data services, need to fully absorb capacity, planning **11** cells



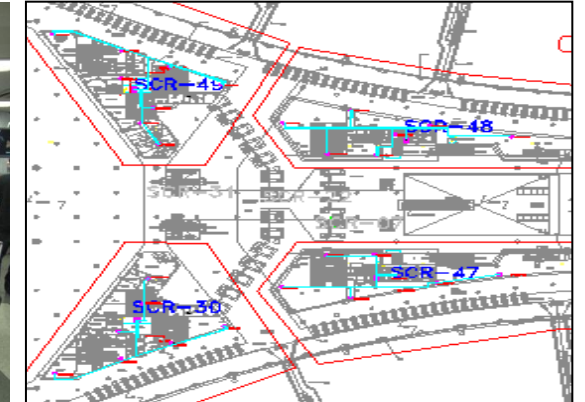
T3 A-2 Arrival hall baggage claim : User are mainly short stay, capacity is small, coverage is the main demand, planning 2 cells



T3 A-B2 car park : low traffic, planning one cell, ensure that the wide area continuous coverage, to avoid handover, to ensure user experience



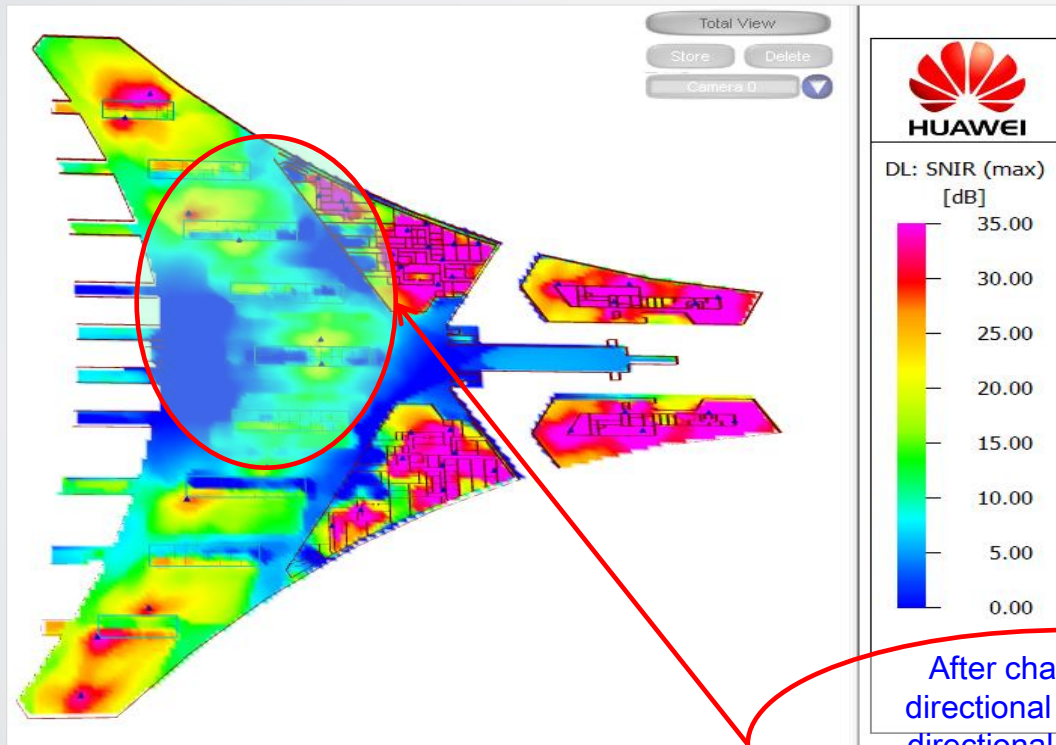
T3 A-3 Security port : Inspection area without traffic, suitable for setting into the cell boundary, ensure user handover experience



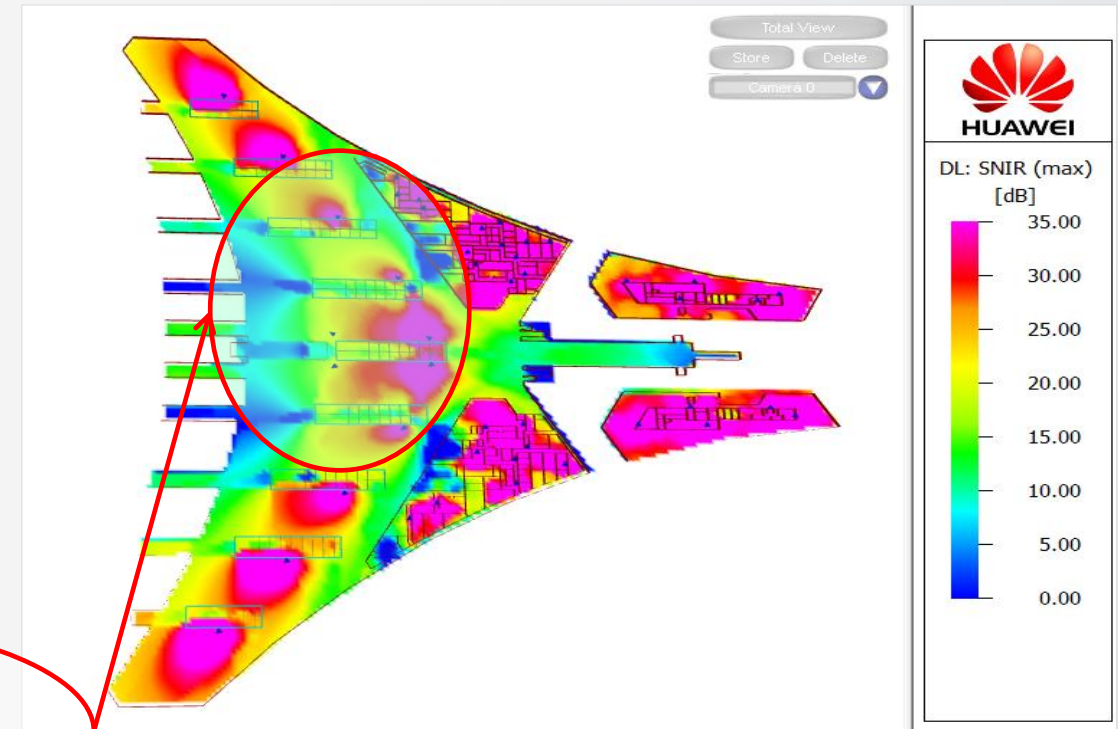
Iterative simulation and verification, to ensure the solution is excellence



Omnidirectional antenna simulation results



Directional antenna simulation results



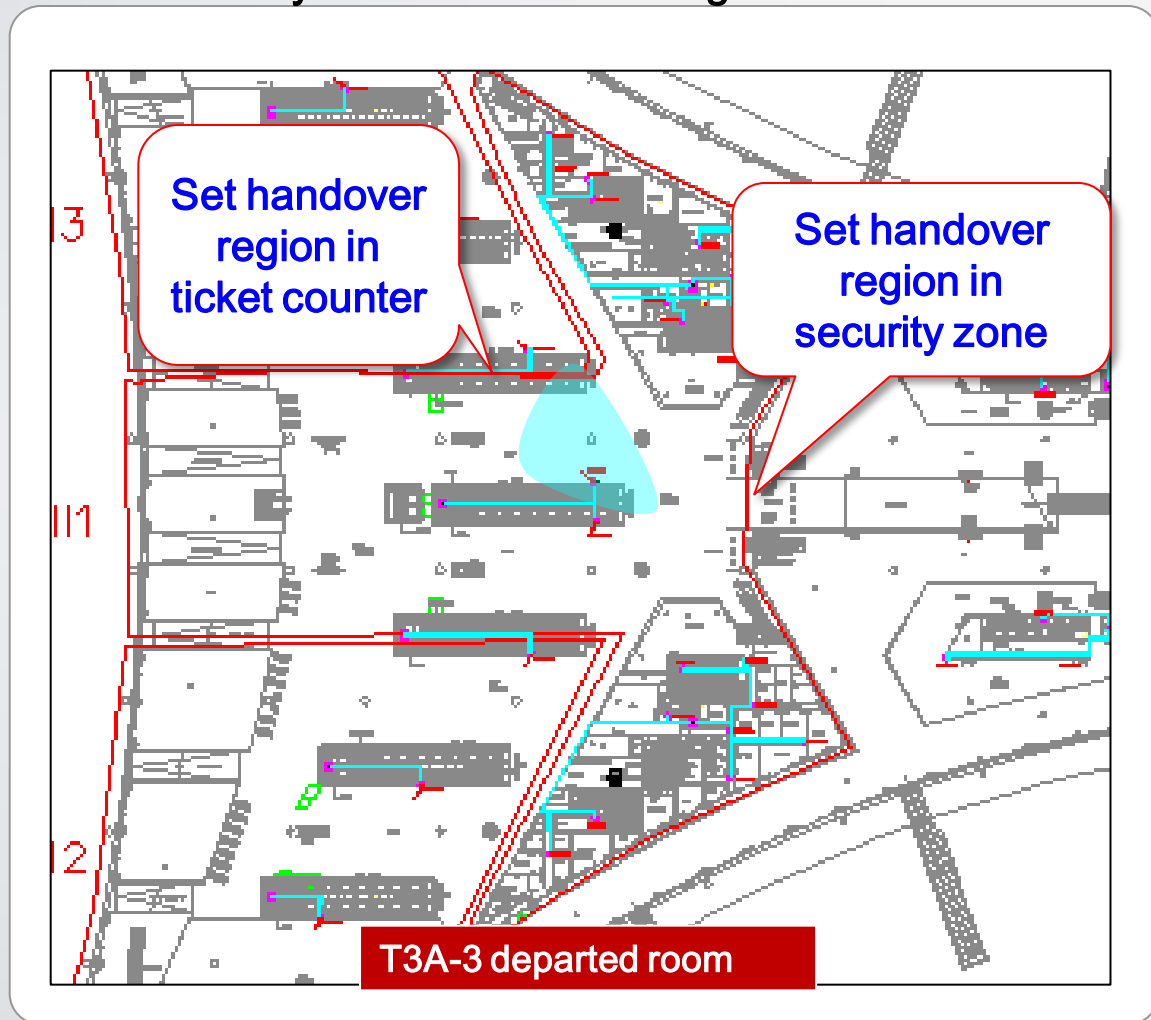
After changed omni-directional antenna with directional antenna, the overlap area SNIR is obviously improved

Using professional IBWAVE and other simulation tools, according to the detailed simulation results to design and adjust the solution, to ensure that the minimum interference

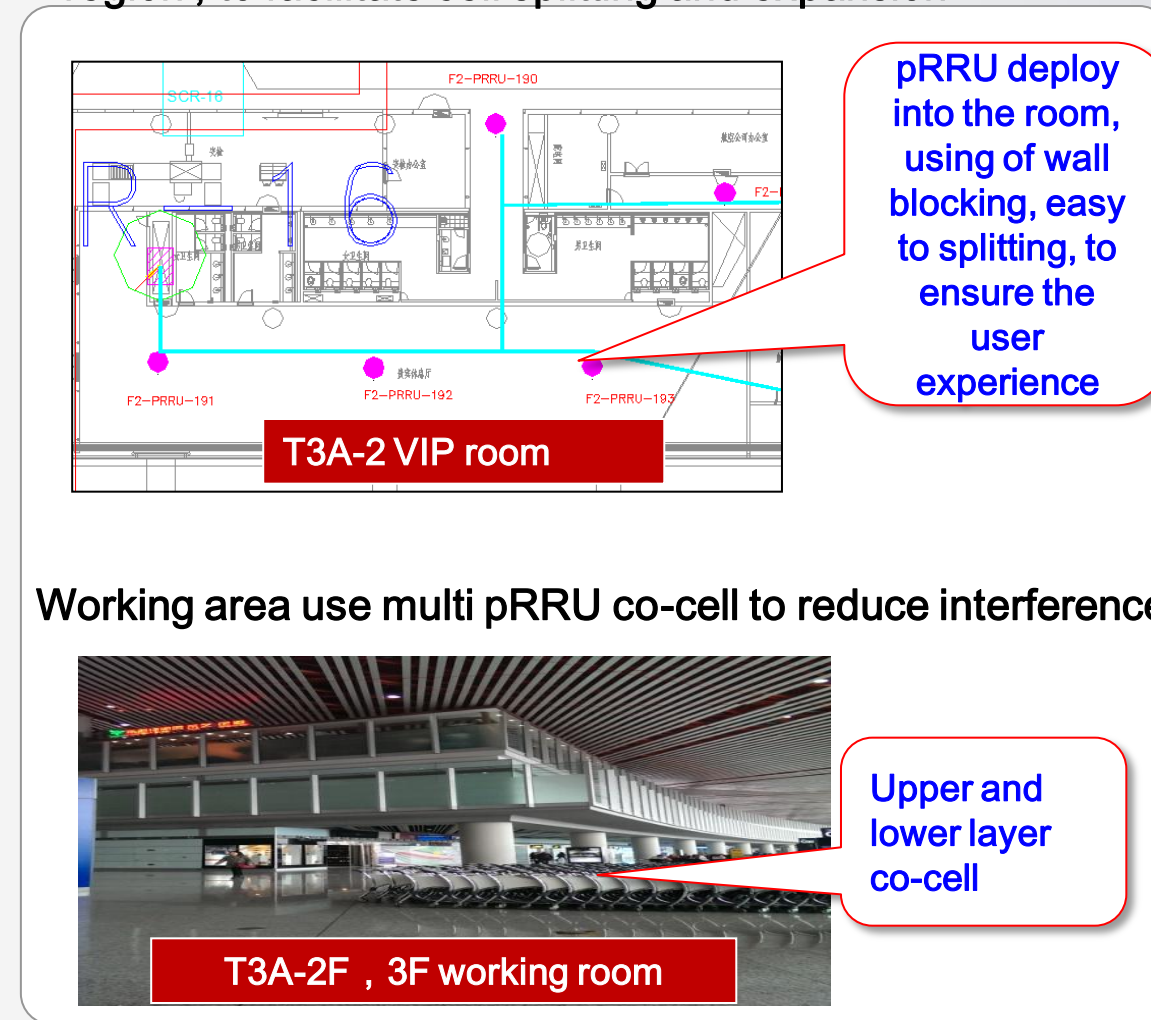
According to the layout of the building , to effective control the interference



Set handover area in low traffic region, such as the security zone and the working area



According to the structure of the building to set the handover region , to facilitate cell splitting and expansion

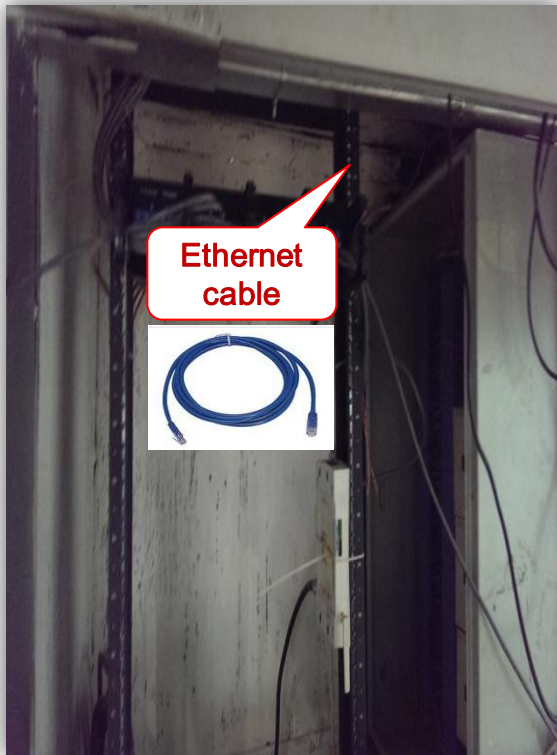


According to the different scenarios customized installation strategy



Ethernet cable deployment

The narrow line and the construction space of the airport are suitable for the ethernet cable deployment.

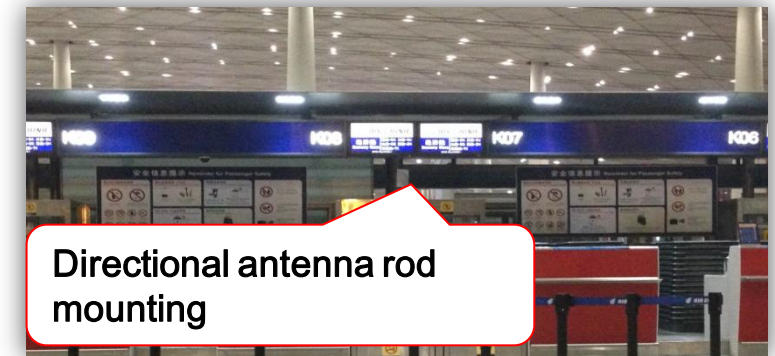


pRRU deployment

pRRU deployed in the compass box , Both to ensure that the implementation of the airport , mean while do not affect the appearance (T3A-3F)



Deploy in the ticket counter (T3A-4F)



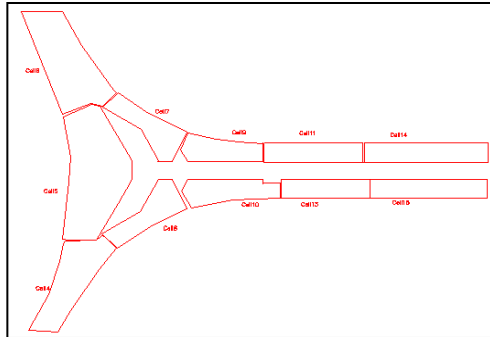
pRRU deployed in the shop



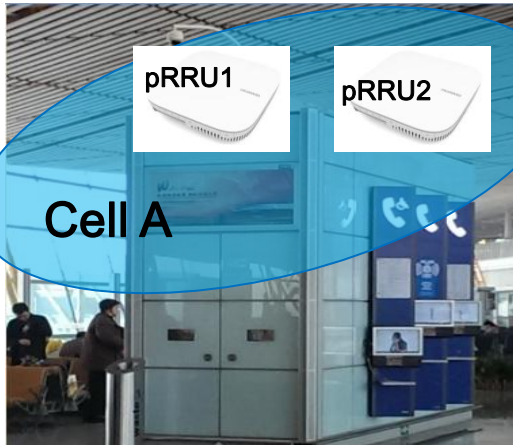
pRRU deploy behind the glass (T3A-3F)



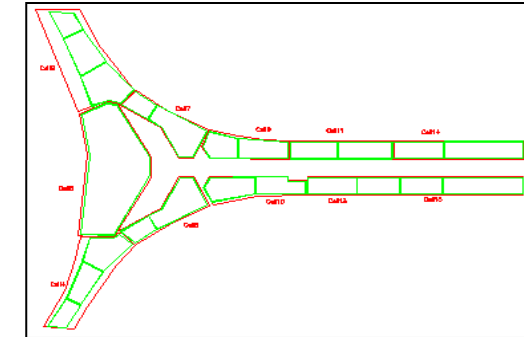
Combination of product feature and engineering design to ensure smooth evolution



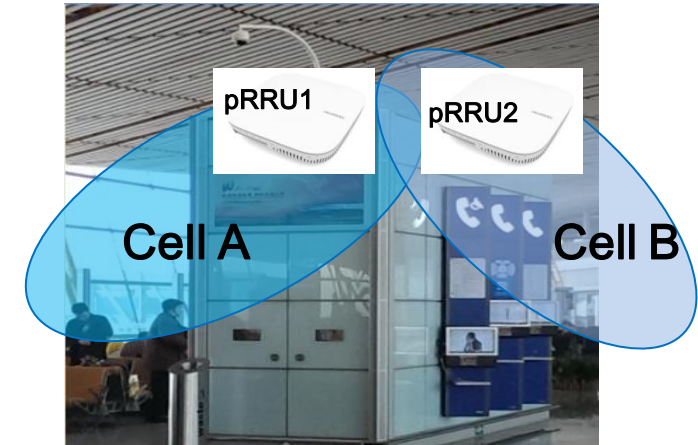
Initial stage co-cell



T3A 3F can be from the current **11** cells, through software configuration quickly expanded to **23** cells or more



Future cell splitting



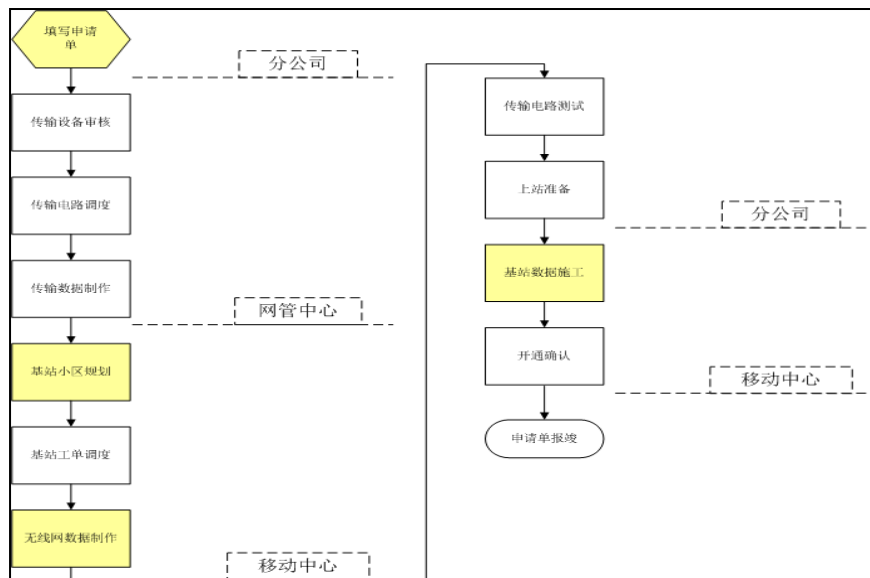
pRRU level cell splitting ensure that the precise expansion of LampSite

Strict quality control, standardization work

Installation guide

- lampsite 典型站点配置标准作业指导书
- lampsite PRRU3901 抱杆场景标准作业指导书
- lampsite PRRU3901 抱龙骨安装场景标准作业指导书
- lampsite PRRU3901 穿板安装场景标准作业指导书
- lampsite PRRU3901 挂墙场景标准作业指导书
- lampsite PRRU3901 天花板吊顶场景标准作业指导书
- lampsite RHUB3908 19 寸机架机柜场景标准作业指导书
- lampsite RHUB3908 挂墙场景标准作业指导书
- lampsite RHUB3908 在 19 英寸机箱场景标准作业指导书

Opening process



Project meeting



standardization work



Construction team training



standardization work



Supervision training

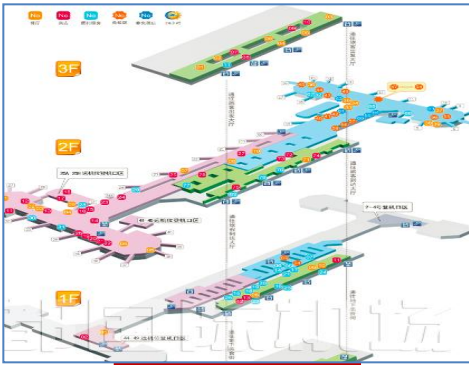


standardization work

Project fast delivery, excellent network quality



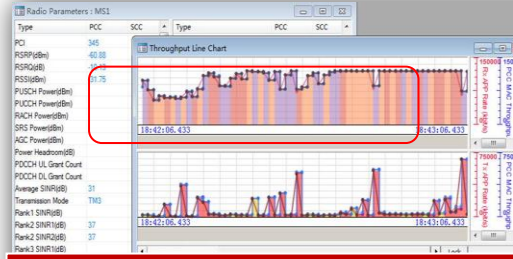
Area	Equipment	Number	Completion rate
T1/T2/T3	BBU	46	100%
	RHUB	400+	100%
	PRRU	2200+	100%



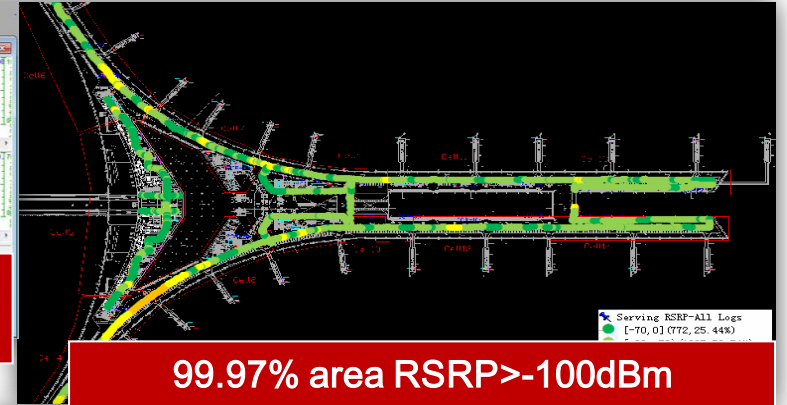
T2



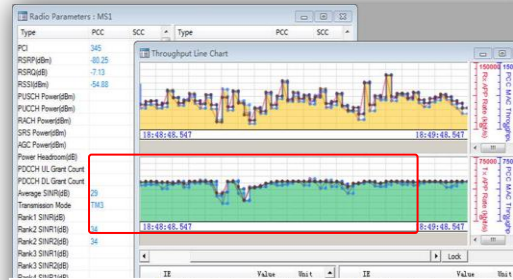
T3



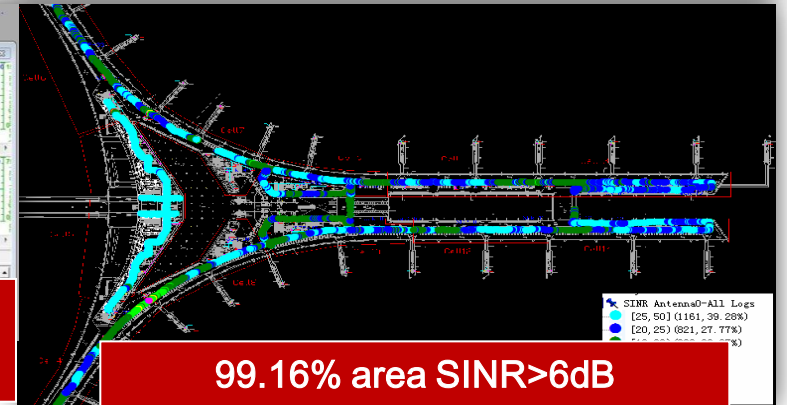
Download peak
146Mbps



99.97% area RSRP > -100dBm



upload peak
49Mbps



99.16% area SINR > 6dB

Test result : all KPI are better than China Unicom demand

Only using 3 months finish 2200+pPRRU, 400+RHUB and 46 BBU deployment

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Key Words LampSite in Beijing Airport Project



Fast Deployment

4 working hrs/day

00:00~04:00

4 months

2200+ pRRU

1/3 time of DAS

High Performance

140Mbps

Peak speed

100Mbps

Average speed

LTE MIMO

3 times of DAS



Economic

Reduce 50%

deployment cost than DAS

Reduce 10%

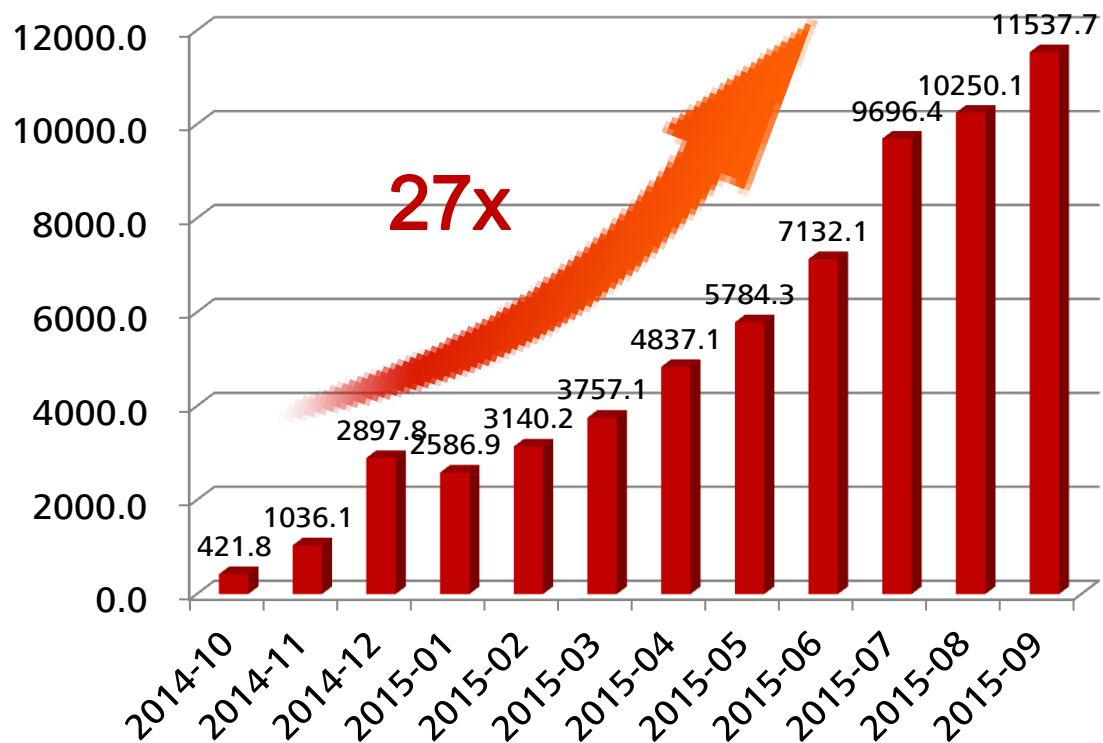
total cost than DAS

90% cost of DAS

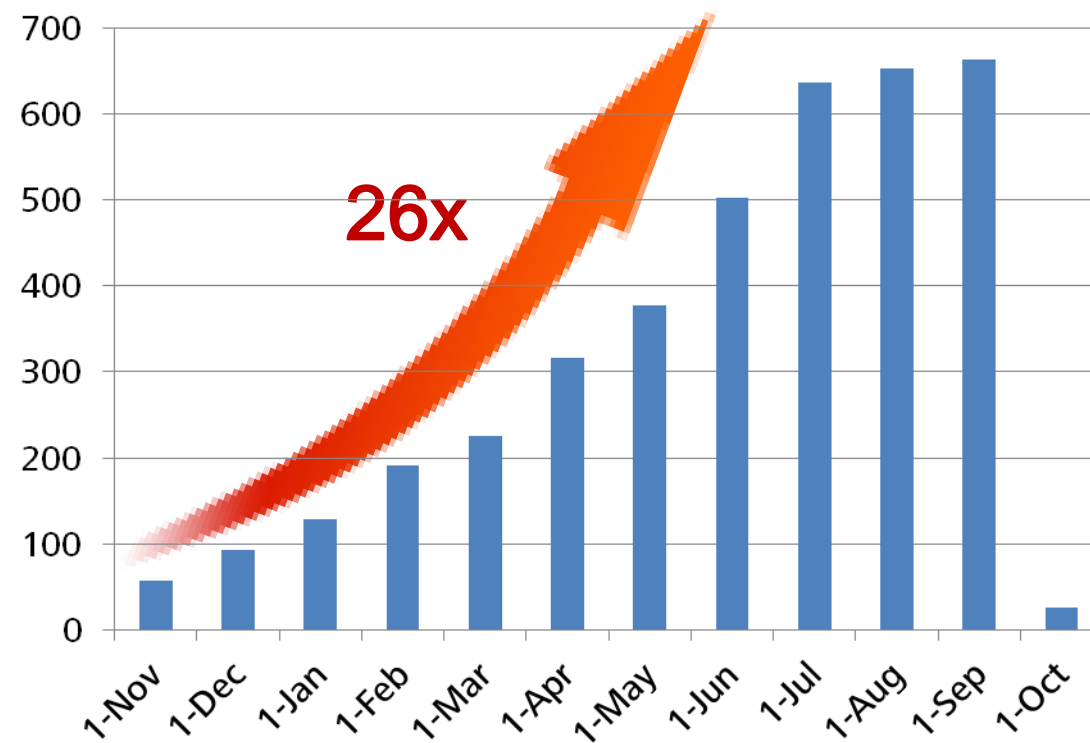
Thanks to a good user experience, Beijing Capital Airport China Unicom 4G traffic increased **27** times in **1** years, the number of users increased **26** times



Traffic (GB)



Avg user number



Thank You

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