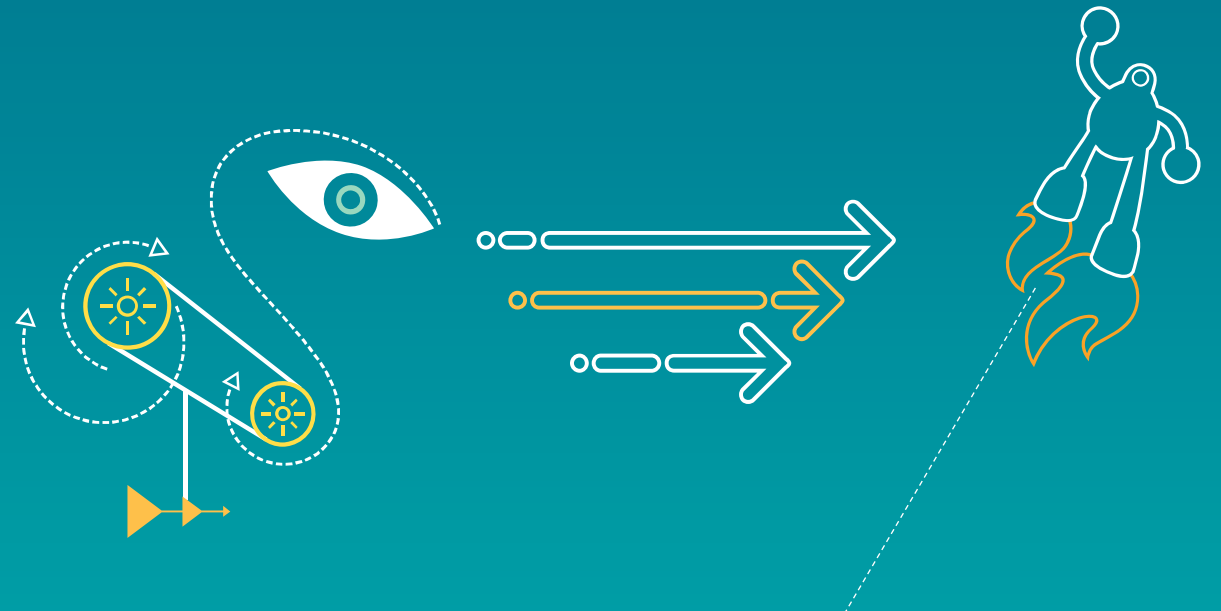


Parag Kar
Vice President, Government Affairs
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Managing Spectrum Auctions



Preview

- Role of Auctions in Spectrum Management
- Understanding demand for spectrum
- Experience with Recent Auctions
- Estimate of Future Spectrum Demand
- Spectrum Available for Auction
- Importance of Harmonized Spectrum
- Releasing Harmonized Spectrum
- Key Takeaways

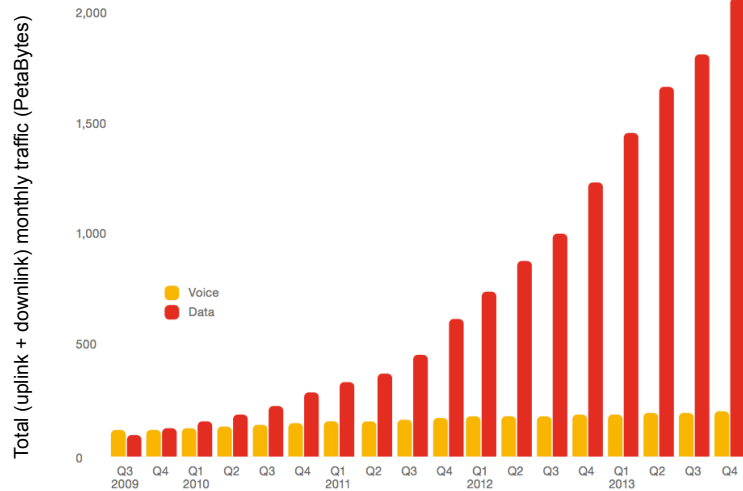
Role of Auctions in Spectrum Management

Why auction spectrum?

- Demand for spectrum outstrips supply
- Transparency of process
- Optimal price discovery
- Efficient use by winners
- Flexible need based buying

Understanding Demand for Spectrum

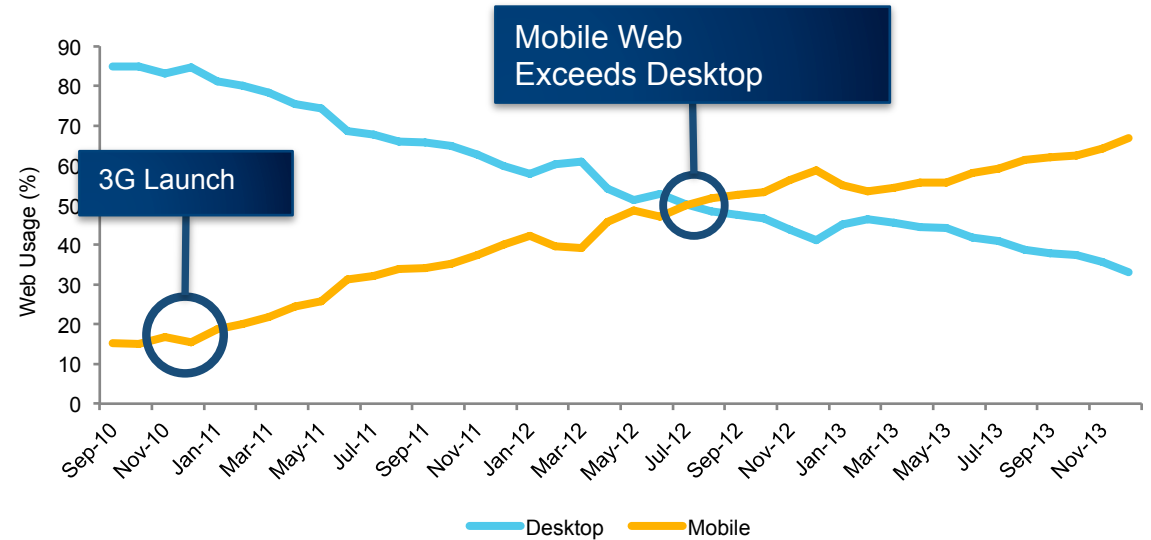
Why demand of spectrum so high?



Global Total Traffic in Mobile networks 2007-2013

(1 Peta = 1000 Tera)

- 2008 – Basic mobile voice phones generated 70% of total traffic
- 2010 – Smart phones, (13% of global handsets in use) generated 78% of total traffic
- 2012 – Despite limited 3G penetration Indian mobile web traffic exceeded desktop traffic
- 2013 – 70% growth in data traffic between Q4 2012 and Q4 2013



Smartphones driving internet in India

Mobile data is highly addictive and consumes more spectrum

Experience with Recent Auctions

What caused the high bids for spectrum?

Snapshot: 2010 - 3G/BWA auctions bidding

S.No	Circle	Airtel	Vodafone	Idea	Aircel	RCOM	Tata
1	AP	5+20	5			5	
2	Assam	5+20	5			5	
3	Bihar	20	5		5	5	
4	Delhi	20	5	5			
5	Gujarat		5	5			5
6	Haryana	5		5	5+20		5
7	HP	5+20			5		
8	J&K	5	5		5+20		
9	Karnataka	20		5	5		5
10	Kerala	20		5	5	5	5
11	Kolkata	20	5	5			
12	Maha		5	5	5		5
13	MP	5		5			5
14	Mumbai	5				5	
15	NE			5		5	
16	Orissa	5	5		5+20	5	
17	Punjab	5		5		5	5
18	Rajasthan	5			5+20	5	5
19	TN				5+20	5	
20	UP (E)	5			5+20	5	
21	UP (W)	5			5+20	5	5
22	WB	5		5	5+20	5	

RMS Rank 1/2

RMS Rank 3+

- Operators adopted offensive strategy
- Market challengers took most spectrum

5+20 = 3G+BWA

Snapshot: 2014 – 2G Auctions bidding

S.N	Circle	Airtel	Vodafone	Idea	RCOM	Aircel	RJIL
1	AP	8.8	0.6	6			5.8
2	Assam						5.4
3	Bihar						
4	Delhi	7.0+6.0	8.0+5.0	0.6+5.0			5.4
5	Gujarat		4.4	1.6			6
6	Haryana		2.4	6			
7	HP	10.2					
8	J&K	2.6				1.8	
9	Karnataka	8.8	5	5			5
10	Kerala	5	7	10			5
11	Kolkata	5.0+7.0	8.0+7.0				5
12	Maha			9			5
13	MP	5.8		7			6.4
14	Mumbai	6.0+5.0	8.2+11	2	0.6		6.6
15	NE	7		5		1.8	6.4
16	Orissa	5					5
17	Punjab	8.2	0.6	8			
18	Rajasthan	8.2	0.8			1.6	
19	TN	5					6.2
20	UP (E)		4			1.8	
21	UP (W)						
22	WB	4.4				1.2	5.6

Expires By 2016

Expires After 2016

- Operators adopted defensive strategy except metros
- Market leaders focused on expiring circles

7+6 = 900+1800

Operators perceived a threat to their business since demand outstripped supply

Experience with Recent Auctions

Why are spectrum costs a concern for the operators?

AGR (Key Operators)	Auction Price (Since 2010)	License & Spectrum Fee	Avg. AGR Growth	Spectrum Carrying Cost (15% of Price)	AGR Growth (%)	Spectrum Carrying Cost (as % of AGR)	License & Spectrum Fee (as % of AGR)
99,886	121,330	13,376	5,101	18,199	5.46%	18.67%	13.36%

AGR Growth Cannot Even Cover Spectrum Carrying Cost

All absolute values in Rs Cr.

- Possible Options
 - Increase Existing Revenue (Raise Tariffs)
 - Find New Revenue Streams (Data Services)
 - Decrease Operational Cost (Increase Business Efficiency)

S. No	Operator	AGR	Auction Price (Since 2010)	Avg AGR Growth
1	Airtel	33,378	39,061	1,626
2	Vodafone	24,715	32,391	1,935
3	Idea	17,503	18,516	1,721
4	Tata	8,277	5,864	721
5	BSNL/MTNL	8,055	16,751	-482
6	RCOM	7,958	8,748	-420
7	Aircel	5,775	10,153	669
Total		99,886	121,330	5,101

Operator's spectrum costs are overtaking their revenue growth

Estimate of Future Spectrum Demand

How much additional data spectrum is required?

Additional Spectrum Req No Additional Spectrum Req

Circle/Band (MHz)	Airtel						Vodafone						Idea					
	900	1800	2100	2300	Spectrum For Voice	Spectrum for Data	900	1800	2100	2300	Spectrum For Voice	Spectrum for Data	900	1800	2100	2300	Spectrum For Voice	Spectrum for Data
AP		8.8	5	0	10	5		6.8	0		6.2	10		6	5		8	5
Assam	1.8	5.65	5	0	7.45	5		6.9	0		6.9	10		5	0		5	10
Bihar	6.2	3	5	0	9.2	5		6.9	0		6.9	10		1.25	0		1.25	10
Delhi	6	7	5	20	10		5	8	5		10		5	8.6	0		8	5
Gujarat		6.2	0	0	6.2	10		4.4	5		9.8	5		1.6	5		6.2	5
Haryana		6.2	0	20	6.2	5		4.9	5		8.7	5		6	5		6.2	5
HP		10.2	5	0	6.2			5.65	0		5.65	10		4.4	5		4.4	5
J&K	6.2	2.6	5	0	6.2	5		6.9	0		6.9	10		5	5		5	5
Karnataka		8.8	5	20	10			13	0		8	5		5	0		6.2	10
Kerala		11.2	0	20	6.2			8.25	0		7.45	10		10	5		8	5
Kolkata	7	5	0	20	8		7	8	5		8.2			5	0		5	10
MP		13.8	0	0	8	10		6.9	0		6.9	10		7	5		8	5
Maha		8.2	0	20	8.2	5		1.25	5		7.45	5		9	5		9.8	5
Mumbai	5	15.2	5	20	9.2		11	8.2	5		10			6.4	0		4.4	10
NE		7	5	0	6.2	5		6.9	0		6.9	10		10	0		5	5
Orissa	6.2	6.8	0	0	8	5		6.9	0		6.9	10		5	0		5	10
Punjab		8.2	0	20	7.8	5		8.05	0		7.45	10		8	5		7.8	5
Rajasthan		8.2	5	0	8.2	5		0.8	0		6.2	10		6.2	0		6.2	10
TN		11.2	5	0	6.2				5		14.2	5		5	0		5	10
UP (E)	6.2	1	0	0	7.2	10		5.25	5		9.45	5		6.2	5		6.2	5
UP (W)		6.2	5	0	6.2	5	6.2	2.5	0		8.7	10			5		8	5
WB	4.4	6.2	5	0	6.2	5	4.4	4.3	5		8.7	5		6.25	0		6.25	10
Total Spectrum Required (MHz)	90						155						155					

3 market leaders alone need 400 MHz for Pan India 10 MHz spectrum for data

Spectrum Available for Auction

Do we have enough spectrum for future use?

Year	2014		2015		2016		2017		2018		2019		2020	
Band	900 MHz	1800 MHz	900 MHz	1800 MHz	900 MHz	1800 MHz	900 MHz	1800 MHz	900 MHz	1800 MHz	900 MHz	1800 MHz	900 MHz	1800 MHz
Spectrum (MHz)	46	385.2	156	88	28	4.2	12.4	0	7.8	4.4	0	0	125.8	66.2

431MHz
Auctioned

Only 244MHz
Coming Up

Only 56MHz
From 2016-2019

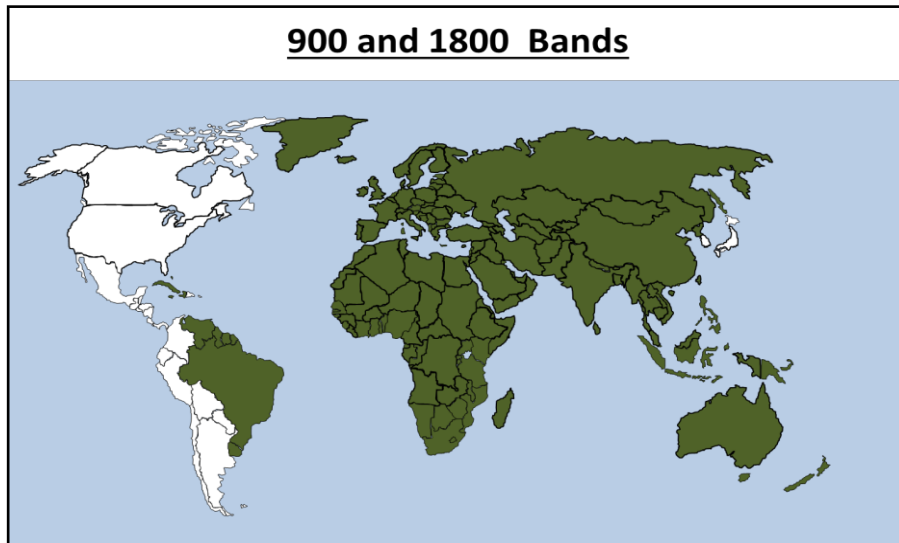
- Spectrum acquired via expiring licenses in 2015 is approximately half of 2014
- Average per circle 900 MHz spectrum is 8-9 MHz vs 15 MHz in 2014
- Next spectrum auctions will also create a huge demand supply mismatch
- Operator's outflows increase unless additional spectrum is put up for auction

Cost for additional data spectrum		
S.No	Operator	Rs Cr
1	Airtel	10,000
2	Vodafone	12,000
3	Idea	18,000
Total		40,000

Expiring licenses will only release 250 MHz against 400 MHz required by just 3 operators

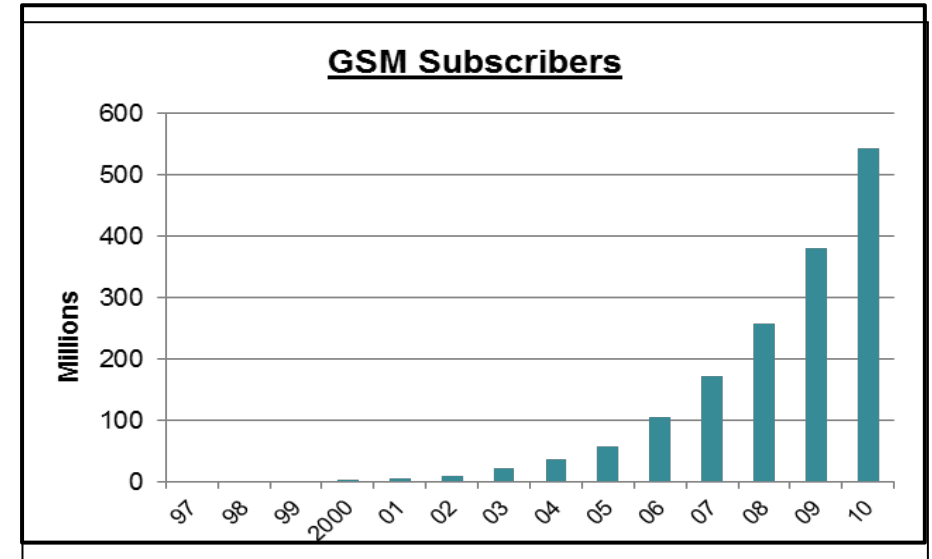
Importance of Harmonized Spectrum

What drove exponential growth of 2G voice services?



Affordable 2G handsets are a result of harmonized spectrum of 900 & 1800

- Simple band structure decreased device complexities and price
- Global bands enable economies of scale and decrease device price
- Incentive of additional spectrum motivated operators to add subscribers

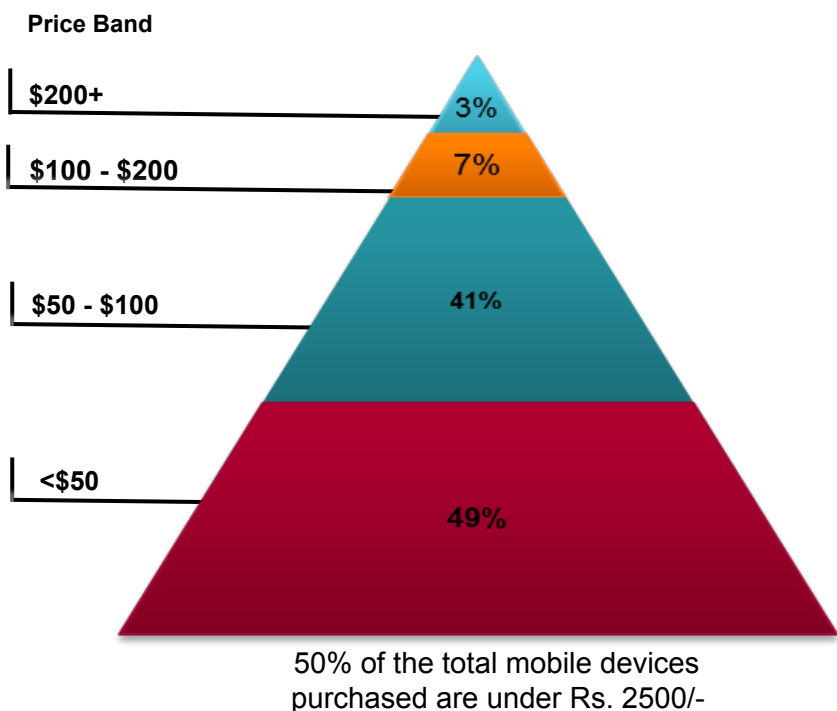


Saw rapid increase in 2G subscribers

Affordable handsets, driven by simple band structure of globally harmonized 2G spectrum

Importance of Harmonized Spectrum

Which spectrum bands are harmonized for mobile broadband?



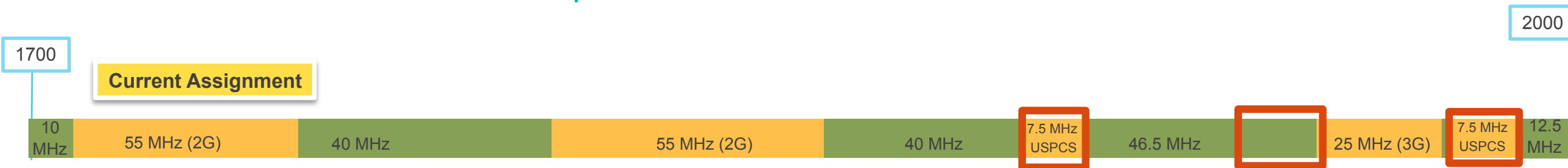
Price Band	LTE Band (MHz)						3G/UMTS	
	700				1800	2300	900	2100
Band Plan	B12 (US)	B13 (US)	B17 (US)	B28 (India)	B3 (India)	B40 (India)	B8 (India)	B1 (India)
# of Phones	11	54	93	0	195	45	~500	~1500
\$500+								
\$400 - \$500								
\$200 - \$400						Lava (1)		
\$100 - \$200								
\$50 - \$100								
<\$50								

Source: IDC, GSA, Public statements by OEMs. Price does not consider operator or other subsidies. Some prices are estimated by similar device on other bands/operators. Data as on date: 24th Feb 2014

900, 1800, 2100 MHz bands are globally harmonized and will drive affordable smartphones

Releasing Harmonized Spectrum

How to release more harmonized spectrum in 2.1 GHz band?



- Rearranging spectrum between Defense and DoT
- Defense is not required to vacate any additional spectrum
- Defense will get larger block of contiguous spectrum
- DoT can enhance value of unclaimed/unused 1900 MHz spectrum

Additional 3 slots of 2x5 MHz

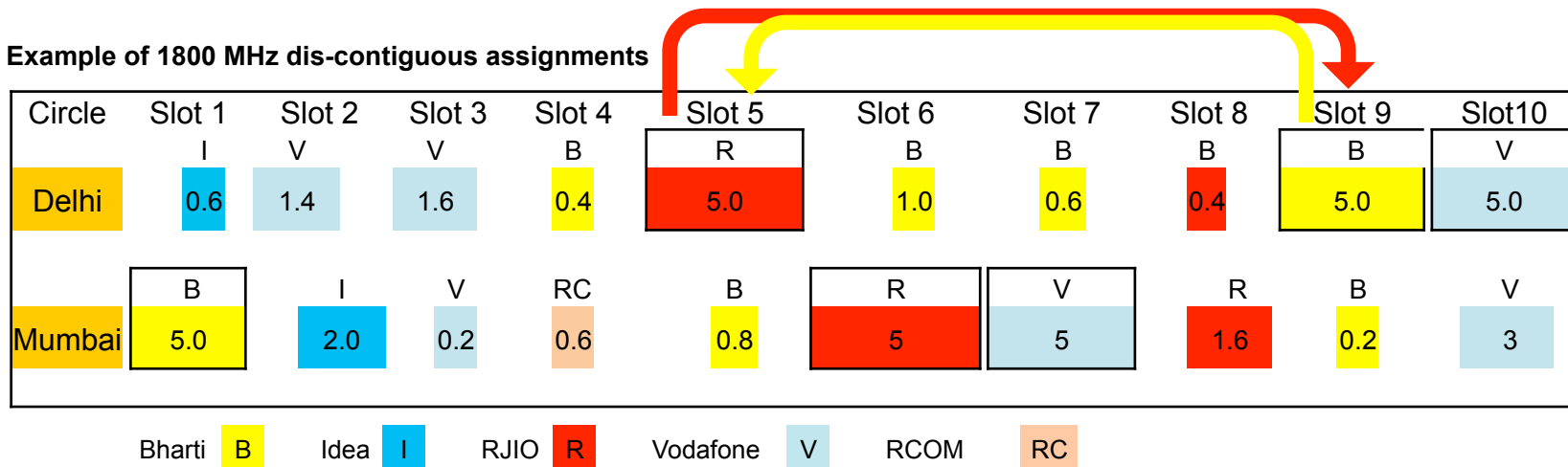
DoT
MoD

Swapping unused 1.9 GHz spectrum can create 3 slots of 2x5 MHz of 3G spectrum

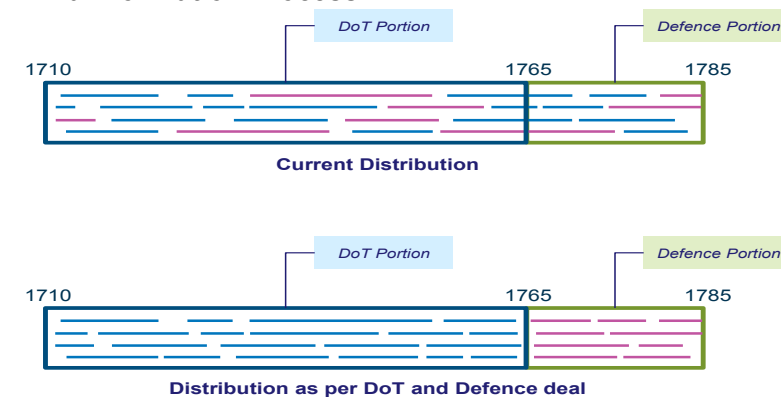
Releasing Harmonized Spectrum

How can we get more harmonized spectrum in 1800 MHz band?

Example of 1800 MHz dis-contiguous assignments



Harmonization Process



S.No	Circle	5 MHz (Contiguous)
1	Delhi	2
2	Gujarat	2
3	Haryana	5
4	Kolkata	2
5	Maharashtra	2
6	Punjab	3
7	Rajasthan	5
8	Tamil Nadu	3
9	Uttar Pradesh (E)	1
10	Uttar Pradesh (W)	2

- 1800 MHz band is highly fragmented (Frequency and geographical domain)
- 2014 auctioned spectrum assignments are also fragmented
- Data technologies are best deployed in larger blocks of contiguous spectrum
- Contiguous blocks will require rearrangement of assigned spectrum to stakeholders
- Rearrangement will need deep coordination among DoT, Defense and Operators

Rearrangement of 1800 MHz can create additional blocks of contiguous spectrum

Releasing Harmonized Spectrum

Why spectrum trading and sharing important?

Parameter	Airtel	Vodafone	Idea	MTNL/BSNL	Aircel	RCOM	Tata	MTS	Telenor
Subs (M)/ MHz	0.83	0.70	0.67	0.27	0.36	0.44	0.33	0.23	1.08
Spectrum Usage (as % of Airtel)	100%	83.9%	80.4%	32.2%	43.8%	52.5%	39.3%	27.4%	129.4%

Excluding BWA and Spectrum Acquired in Recent Auctions

- Airtel has the highest spectrum utilization factor
- Utilization factor is less than half of Airtel for MTNL/BSNL, Aircel, Tata
- Most commercial spectrum is not fully utilized
- Sharing and trading will unlock the value of investment
- Sharing and trading will enable another source and stabilize spectrum price

S. No	Operator	Spectrum (MHz)	Total Subs (Millions)
1	Airtel	232.05	193.4
2	Vodafone	222.55	155.5
3	Idea	189.9	127.2
4	BSNL/MTNL	378.1	101.6
5	Aircel	173.4	63.2
6	RCOM	265.5	116.3
7	Tata	194.15	63.5
8	MTS	41.9	9.6
9	Telenor	30	32.4

Sharing and trading can unlock value of investment and stabilize spectrum price

Key Takeaways

- Need More Harmonized Spectrum for Data
 - Spectrum available through expired licenses is grossly inadequate
 - Swapping proposal can enable 3 slots of 2x5 MHz of 3G spectrum
 - Harmonization of 1800 MHz band can create more 4G spectrum
- Need to Manage Future Auctions
 - Increase spectrum supply to prevent irrational bidding
 - Flexible trading and sharing rules will promote conscious bidding

Thank you

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Future Auctions

Do we have enough spectrum from expiring licenses?

Circle	2014		2015		2016		2017		2018		2019		2020	
	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band	900 MHz Band	1800 MHz Band
Delhi	16	4+17					6.2							
Mumbai	16	2+21.4					6.2							
Kolkata	14	3.8+21.2											6.2	3.8
Maha		14	14	8.2									6.2	3.8
Gujarat		12	14	2									6.2	1.2
AP		22.6	14	4									6.2	3.8
Karnataka		24.6			14	2.2							6.2	3.8
TN		30.2	6.2	8					7.8	4.4			6.2	2
Kerala		28	12.4	1.8									6.2	3.8
Punjab		18.4	7.8	7.8	7.8								6.2	6.2
Haryana		16.4	12.4	12.4									6.2	3.8
UP (W)		2.4	6.2	1.8									6.2	3.8
UP (E)		8	6.2	2									6.2	3.8
Rajasthan		19	6.2	6.2	6.2	2							6.2	1.8
MP		19.2	12.4	1.8									6.2	3.8
WB		11.2	4.4	1.8									6.2	1.8
HP		20.4	12.4	12.4									6.2	3.8
Bihar		2.4	6.2	1.8									6.2	3.8
Orissa		26.2	6.2	6.2									6.2	3.8
Assam		11.4	6.2	6.2									6.2	3.8
NE		25	8.8	3.6									6.2	3.8
J&K		4.4											8	
Total	46	385.2	156	88	28	4.2	12.4	0	7.8	4.4	0	0	125.8	66.2

Auctioned

- Spectrum acquired via expiring licenses in 2015 is approximately half of 2014
- Average per circle 900 MHz spectrum is 8-9 MHz vs 15 MHz in 2014
- Next spectrum auctions will also create a huge demand supply mismatch

Will need additional spectrum in harmonized band prevent unusual price rise