Broadband Spectrum Management

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Presentation outline

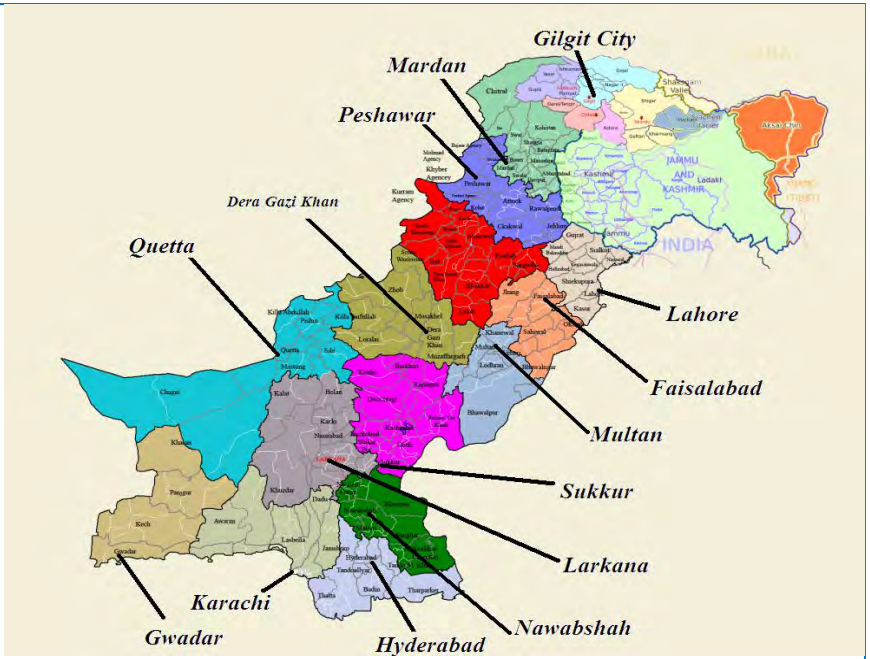
1. Licensing and Polices
2. Evolution and Trend in Broadband
3. Types of Auctions and its implementation in Pakistan
4. Coverage of 2G ,3G /4G and assignments
5. Lesson Learned from Auctions-Pakistan
6. Future Spectrum Availability
7. Harnessing Digital Dividend
8. The Economics value of Spectrum

Slide 2

Licensing1 to be included
WLL and Mobile Dte, 14/07/2016

Licensing2 to be included
WLL and Mobile Dte, 14/07/2016

Pakistan : An Overview



Population, mil 196 (6th Largest Population)

Land Area 796,096 km²

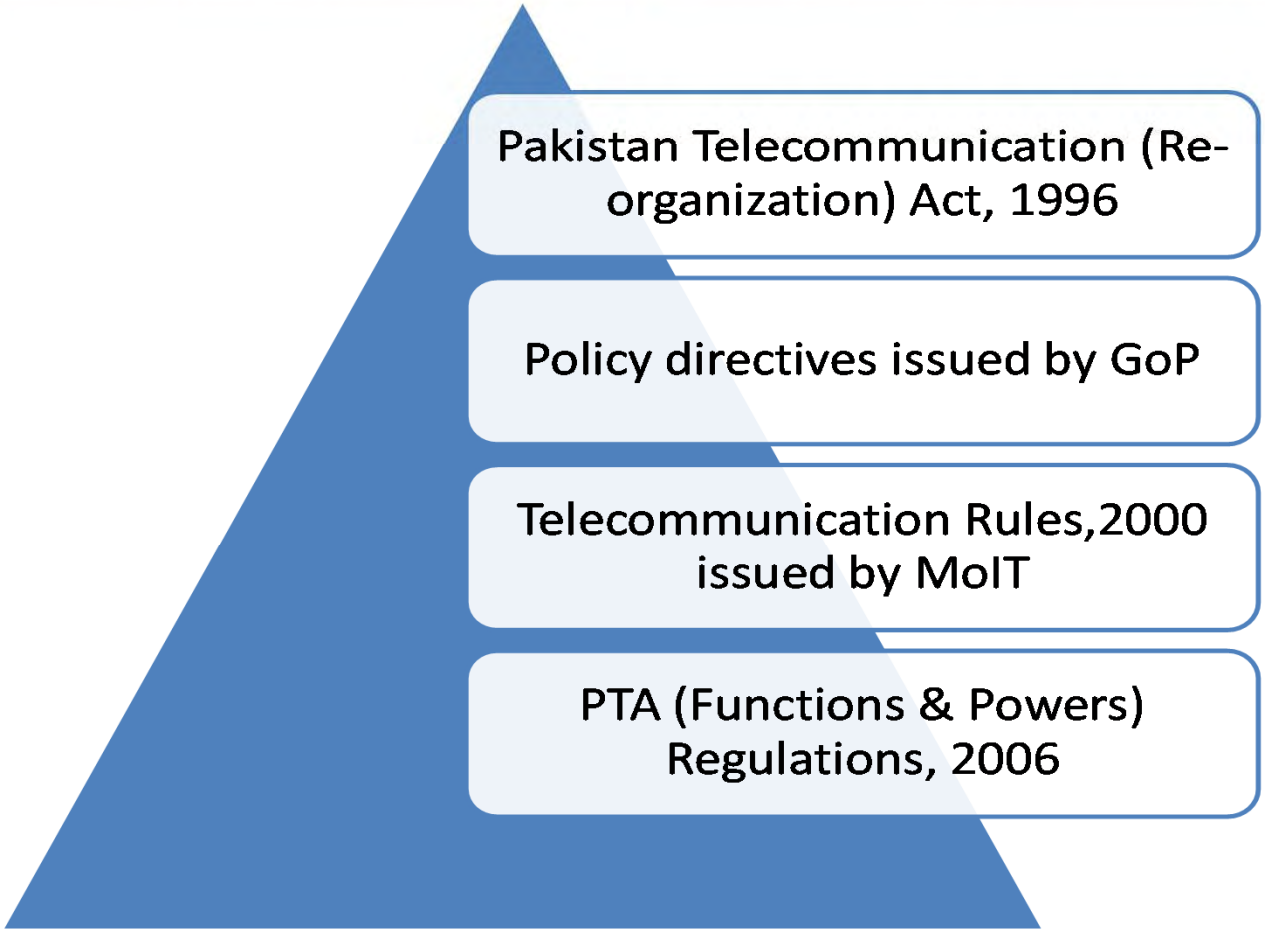
- 36th Largest Area

Key Stats

- Income /Capita US $1307
- Literacy Rate 53%
- Media Age 21.2
- Geo-strategic Location
- Population and workforce

- Pakistan has the **6th largest population** in the world, making it an **attractive market** for global investors
- The country is expected to have more than **230 mln** inhabitants by 2030 with ~2% per annum growth
- Its population is **young** and becoming **more educated**
- **Urbanization** trend is expected to continue, reaching a level of **43%** by 2030
- It is expected that by 2050, Pakistan will be the **31st** largest economy in world with nominal GDP of **675 bln USD** from its current state of ~240 bln USD (43rd largest economy as of 2013)

Legal Instruments



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Licensing

- Wireless Licensing
  - WLL &Mobile
  - RBS Licensing
- Wireline Licensing
  - Fixed (LL , LDI CVAS, Infrastructure etc)
- Technology and Service Neutrality

Key Policies for Telecom Sector

De-Regulation Policy 2003

- Fixed line Policy.
- Open and Technology Neutral
- License Term - 20 Years
- Local Loop (LL) – ILF US$ 10,000 / region - 14 Regions
- Wireless Local Loop Option (Spectrum Auctioned)
- Long Distance and International (LDI) – ILF US$ 500,000
- Deregulated incumbent operator PTCL.
- Introduced Access promotion Contribution, Universal Service Fund Regime.

Cellular Mobile Policy 2004

- Cellular Mobile Policy.
- Technology Neutral
- 2 New cellular Licenses were issued for 15 years.
- Open Auction.
- Promoted efficient use of Spectrum.
- Fair Competition amongst mobile and fixed line operators
- Role-Out Obligations – 70% Tehsil HQs within 4 years.
- US$ 15M Performance Bond.
- Existing Operators to Pay Same Amount for Renewal.
- Promoted Infrastructure sharing, National Roaming, Mobile Number Portability.

Telecommunications Policy 2015

- Universally available, affordable and quality telecommunication services
- Open Sky Policy for Fixed , Broadcast and Mobile Satellite Service telecommunication services
- Spectrum Refarming, Sharing and Trading
- Wifi Offloading
- Over the Top Services
- Review of licensing framework

Types of Licenses

- Wireless local Loop (WLL) Licenses
  - Issued under the provisions of De-Regulation Policy for Fixed Line Sector.
  - Local Loop licenses with Spectrum Assignment in 450,479, 1900,3500 MHz.
  - Country Divided into 14 telecom Regions.
  - Scope Includes Provision of Fixed services through predefined cell with limited mobility.
- Mobile Licenses
  - Issued under Cellular Mobile Policy 2004
  - 2G (GSM) Licenses
  - 3G/4G (NGMS) Next Generation Mobile Services licenses in 2014 and 2016.
  - Scope includes provision of Mobile Services.

RBS

- Wireless Licenses (5 years)

a) HF
b) VHF
c) UHF

- Aeronautical Services (5 years)

a) Aircrafts
b) Ground to Air Communication

- Maritime Communication (5 years)

a) Ships
b) Coast Station

- Microwave Site Clearance
- Inmarsat Permission (Yearly)
- Amateur License (5 years)
- FM (Till the duration of PEMRA Lic)

Note. All renewals are subject to annual payments and first come first served basis.

LDI

– Long Distance & International (LDI)

LDI service covers the provision of end to end communication between points;

- that are located in different Regions,
- that are not in the same Local Calling Area, or
- that are located more than 25 Km apart and
- that are located in Pakistan with points that are located outside of Pakistan.

TIP

– Telecommunication Infrastructure Provider (TIP)

The TIP license authorized the licensee to establish and maintain the following infrastructure facilities in Pakistan to lease, rent out or sell end to end links to telecom operators licensed by PTA on mutually agreed terms strictly keeping in view their license;

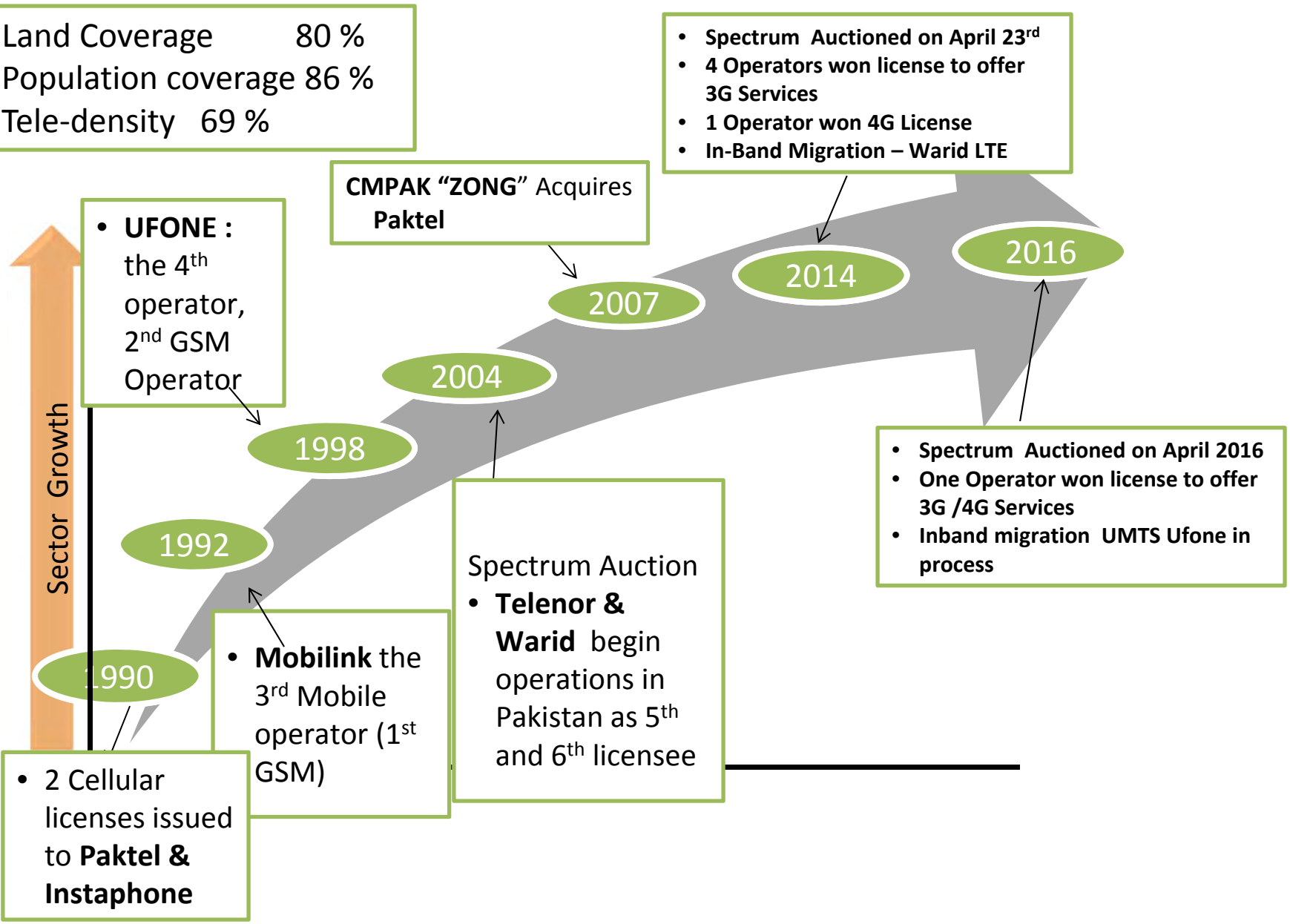
- Earth Station & Satellite Hub;
- Optic fiber cables;
- Radio communications links;
- Submarine cable landing station within fifteen miles of costal area of Pakistan subject to approval by the Authority & clearance of Ministry of Defense and Ministry of Interior;
- Towers, poles, ducts and pits used in conjunction with other infrastructure facilities; and
- Such other telecommunication infrastructure as the Authority may, by Regulation, require.

CVAS

- **Data CVAS License and Voice CVAS License**
- **Services – Data CVAS**
  - Data
  - Internet
  - Vehicle Tracking
- **Services – Voice CVAS**
  - Card Pay Phone Services
  - Premium Rate Services
  - Trunk Radio Services
- **Region**
  - Pakistan
  - Provincial
  - AJK
- **Rollout**
  - Commencement of the licensed services within one year.

History of Cellular Mobile Services in Pakistan

Land Coverage 80 %
Population coverage 86 %
Tele-density 69 %



SOURCE: PTA Data

Broadband Evolution IN PAKISTAN

- Basic Internet and Email -1990
- Fixed Broadband-2001
- Broadband Policy-2004
- GPRS –EDGE -2005-06
- FTTH -2006
- WIMAX –EVDO -2009
- WCDMA – 2014
- LTE -2015

What broadband means for Pakistan?

e/m-Administration

e/m-Governance

Voice

Infrastructure

IT Outsource

Internet

M-banking

M-Business

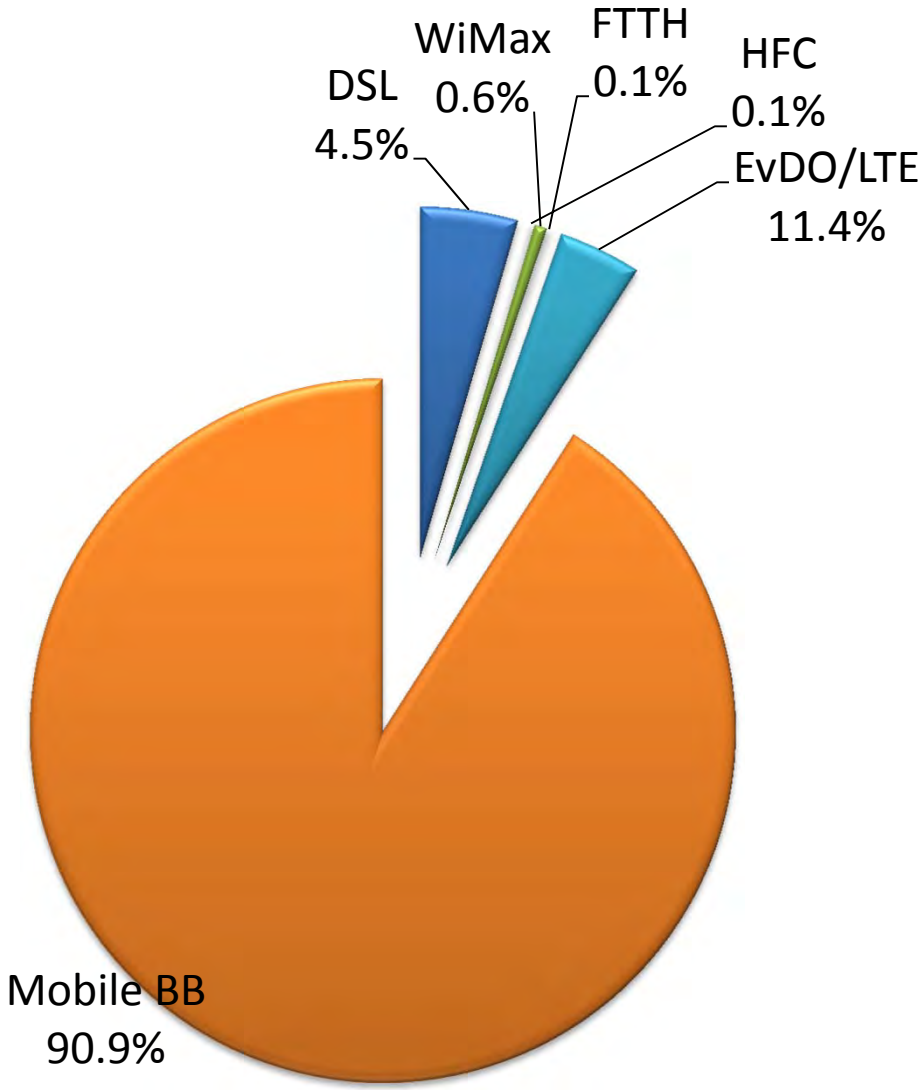
IT Park

IT Industry

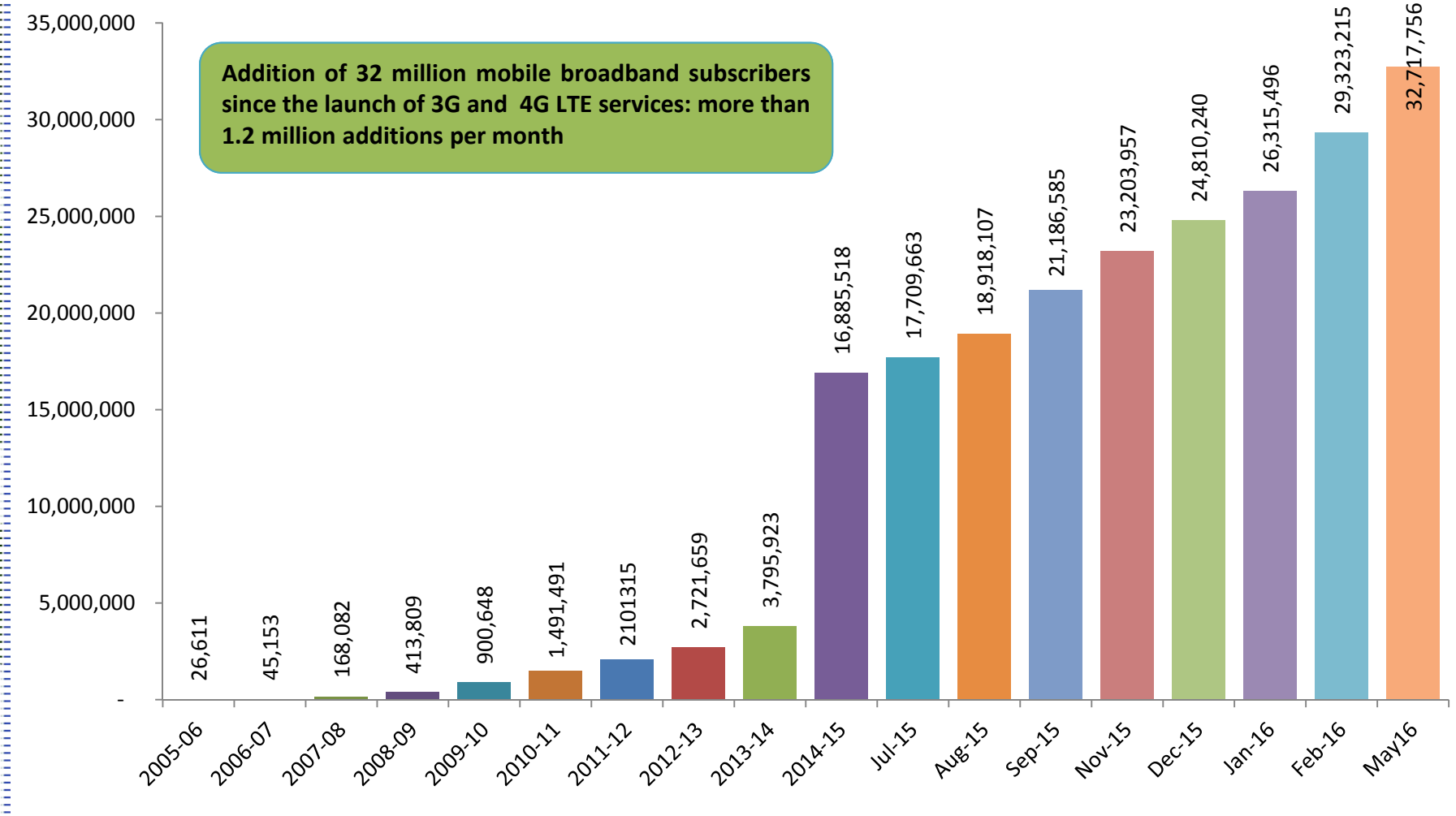
Health services

Public information

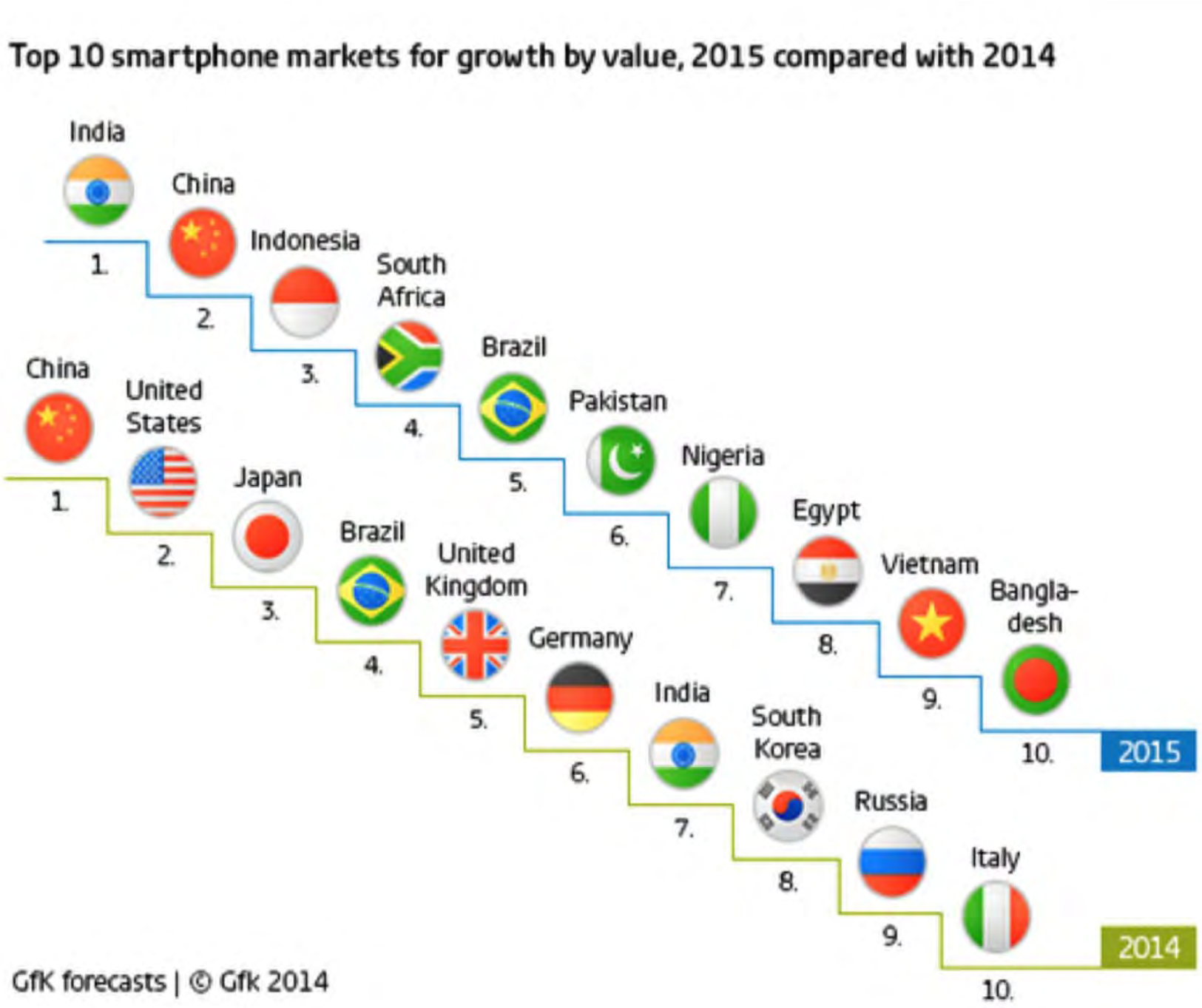
Broadband Market Share by Technology



Growth in MBB After 2014 Spectrum Auction



Note: Fixed Broadband figures are as of Mar-16


Top 10 smartphone markets for growth by value, 2015 compared with 2014
India
China
Indonesia
South Africa
Brazil
Pakistan
Nigeria
Egypt
Vietnam
Bangla-desh
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
2015
China
United States
Japan
Brazil
United Kingdom
Germany
India
South Korea
Russia
Italy
1.
2.
3.
4.
5.
6.
7.
8.
9.
10.
2014
GfK forecasts | © Gfk 2014

Comparison of Auction Formats

Auction format	Description	Pros	Cons	Experience
Sequential sealed bid/oral outcry	• Blocks auctioned one at a time and assigned to highest bidder	• Simple • Transparent	• Difficult for bidders, • Prices of identical blocks can differ significantly • Inefficient • Low revenues	• Bangladesh • Sri Lanka • New Zealand • Pakistan
SMR/SMRA or Simultaneous Clock Auction (SCA)	• All blocks allocated simultaneously over multiple rounds with information provided at the end of each round. • Auction ends when there is no excess demand on none of the blocks put out for sale	• Efficiency • Similar blocks sell for similar prices • Transparency • Allows simultaneous bids for complements	• Potential exposure problem with complements • Parameter settings can affect outcome and bidding behavior	• India • Taiwan • Thailand • US • Germany • UK • Many others
Combinatorial clock auction	• Auction has 2 stages: clock phase similar to SMR followed by a sealed-bid phase • Bidders place bids for combination of blocks (packages) • Package bids from clock phase and sealed-bid phase are considered and auctioneer selects value maximizing combinations.	• Efficiency • Allows all-or-nothing bids for packages of complements	• Lack of transparency • Equity – smaller packages can sell for more than larger ones • Not necessarily bring higher revenues to auctioneer	• UK • Netherlands • Switzerland • Ireland • Others
Menu auctions		• Allows all-or-nothing bids for packages of complements • Efficiency • Transparency • Simple	• Difficult for bidders • Some randomness due to sealed-bid, one-shot • Less well suited for common value auctions	• France

Lessons Learned - International Auctions

- Number of bidders is a key driver of value
- Take-up of technology upgrades mainly depends on market conditions and operator activities:
  - Market conditions
    . Affordability of the market for technologically up-to-date equipment and new services
    . Need in the market for broadband services being affected by fixed broadband penetration
  - Operator activities
    . Level of investment in coverage
    . Strength of sales and marketing campaigns
    . Pricing strategies of operators
- Simultaneous launch by operators is critical and drove the success of take-up in Korea
- Wireless broadband demand is expected to be higher in large countries with relatively lower fixed broadband penetration, resulting in higher spectrum valuations
- Regulatory binding rules such as mandatory investment in rural areas where fixed BB is not available might affect the financial strength of operators to bid in the auction
- High reserve prices succeed to raise the auction price only if the operators are financially strong
- Tight spectrum cap setting for existing operators tends to decrease the auction price
- Spectrum cost can vary substantially based on allocation methods; for example:
  - France: first-price sealed bid auction which is likely to have driven up the price
  - Malaysia: beauty contest allocation which had a price pre-set by the regulator

NGMS Auction - 2014

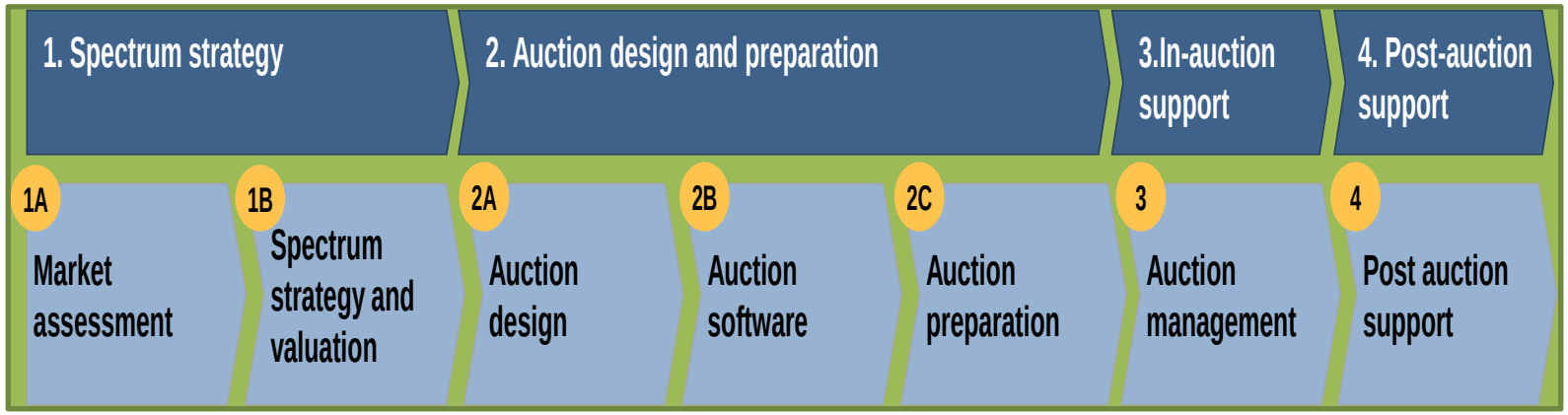
GOP issued Policy Directive - October 2013

- Transparent, Competitive auction for NGMS in Pakistan.
- 30 MHz paired Spectrum in 1.9/2.1 (GHz) band
- 20 MHz paired Spectrum in 1800Mhz band.
- 7.38 MHz paired Spectrum in 850MHz band (new entrant)
- PTA to hire Internationally reputed Consultant
- Payment terms were 100% advance or 50% advance with the rest in 5 years (LIBOR)
- License duration 15 years

- Base Price was kept at more than the highest level of valuation of spectrum:
  - USD 295 Million for 10 MHz in 2100 MHz
  - USD 210 Million in the 1800 MHz
  - USD 291 Million for 850MHz
- The spectrum cap in 2100MHz was 15 MHz and 10 MHz in the 1800 MHz band
- Rollout and Performance Obligations

Case Study NGMS Auction Process *(Continued)*

- PTA hired Internationally reputed Consultant through open and transparent hiring process. (value partners UK based)
- The Consultant assisted PTA in accomplishing the:
    - Market Assessment.
    - Industry Consultation.
    - Spectrum Valuation.
    - Auction Design using Simultaneous Multiple Round Ascending Auction (SMRA).
    - Mock Auction for Prospective bidders



CASE STUDY NGMS AUCTION PROCESS *(CONTINUED)*

- IM published in February 2014 for auction of frequency slots.
    - 2 x 30 MHz FDD in 2100 MHz band
    - 2 x 20 MHz FDD in 1800 MHz band
    - 2 x 7.38 MHz FDD in 850 MHz band (offered for new entrants only)
- Minimum roll out obligations defined for 2100,1800 & 850 MHz and segmented into 4 phases.
- New entrant was offered one year extension for Roll out in 2100 MHz.

- Minimum user data rate of 256Kbps typical defined for 3G.

Case Study NGMS Auction Process *(Continued)*

- Roll out obligations relaxed for 4G roll out in 1800 MHz.
- Minimum user data rate of 2Mbps typical defined for 4G.

IM also briefed other obligations pertaining to National Roaming, Infrastructure sharing and QoS obligations.

NGMS Auction Results

- Sealed bids were invited from the prospective bidders along with Bid Earnest Money in 1st Stage. (15 % base price)
- Due to excess demand of spectrum the process went into 2nd Stage.
- SMRA Auction was conducted on 3 April 2014.
- All the four bidders won the spectrum amongst the available lots in 2100 & 1800 MHz.
- The auction met the government's targeted revenue of approx. 1.2 billion USD
- One block of 1800MHz and 850 MHz remain vacant.

NGMS Auction - 2014

- Zong got spectrum for both 3G and 4G MHz
- Mobilink got spectrum for 3G
- Ufone got spectrum for 3G
- Telenor got spectrum for 3G

Government got a total of **USD 1.22** Billion from the auction and advance tax.

WLL Spectrum Auction 2015 – Base Prices

Spectrum Band	Telecom Regions	Spectrum Quantity	Base Price (Rs) Million
1900 MHz (EPCS Band)	TR-I Mirpur	2 x 5 MHz	55.8028
	TR-II Muzaffarabad		11.9577
	TR-III Northern Areas(GB)		7.9718
3.5 GHz	TR-I Mirpur	30 MHz (2 Lots)	7.9718
	TR-II Muzaffarabad		3.1887
	TR-III Northern Areas(GB)		3.1887

WLL Spectrum Auction 2015 – Final Results

1900 MHz			3.5 GHz		
TR-I	TR-II	TR-III	TR-I	TR-II	TR-III
PTCL 55.8028 (PKR-M)	PTCL 11.9577 (PKR-M)	PTCL 7.9718 (PKR-M)	LDN 10.0 (PKR-M)	PTCL 3.1887 (PKR-M)	PTCL 3.1887 (PKR-M)
			PTCL 10.0 (PKR-M)	PTCL 3.1887 (PKR-M)	PTCL 3.1887 (PKR-M)

Consultancy Services for Remaining NGMS Spectrum 2015-16

- PTA contracted InterConnect Communications on 31st Oct 2015 for consultancy services
- Comprehensive market evaluation/assessment to clearly determine the market demand of spectrum, it's base price and market value, and the best timeline to carry out further auction of spectrum.
- Two auctions separated in time would have benefits:
    - 850 MHz auction was recommended to be carried out in 2016 with a market value of 383 – 457 Million USD
    - The Consultant recommended auction of 1800MHz in 2017 or beyond
- Certainty around the renewal of existing licenses in 2019 plays a critical role in MNOs' desire to participate in the auction.
- The merger of Mobilink and Warid will have positive impact on market competition

NGMS Auction - 2016

GOP issued Policy Directive - April 2016:-

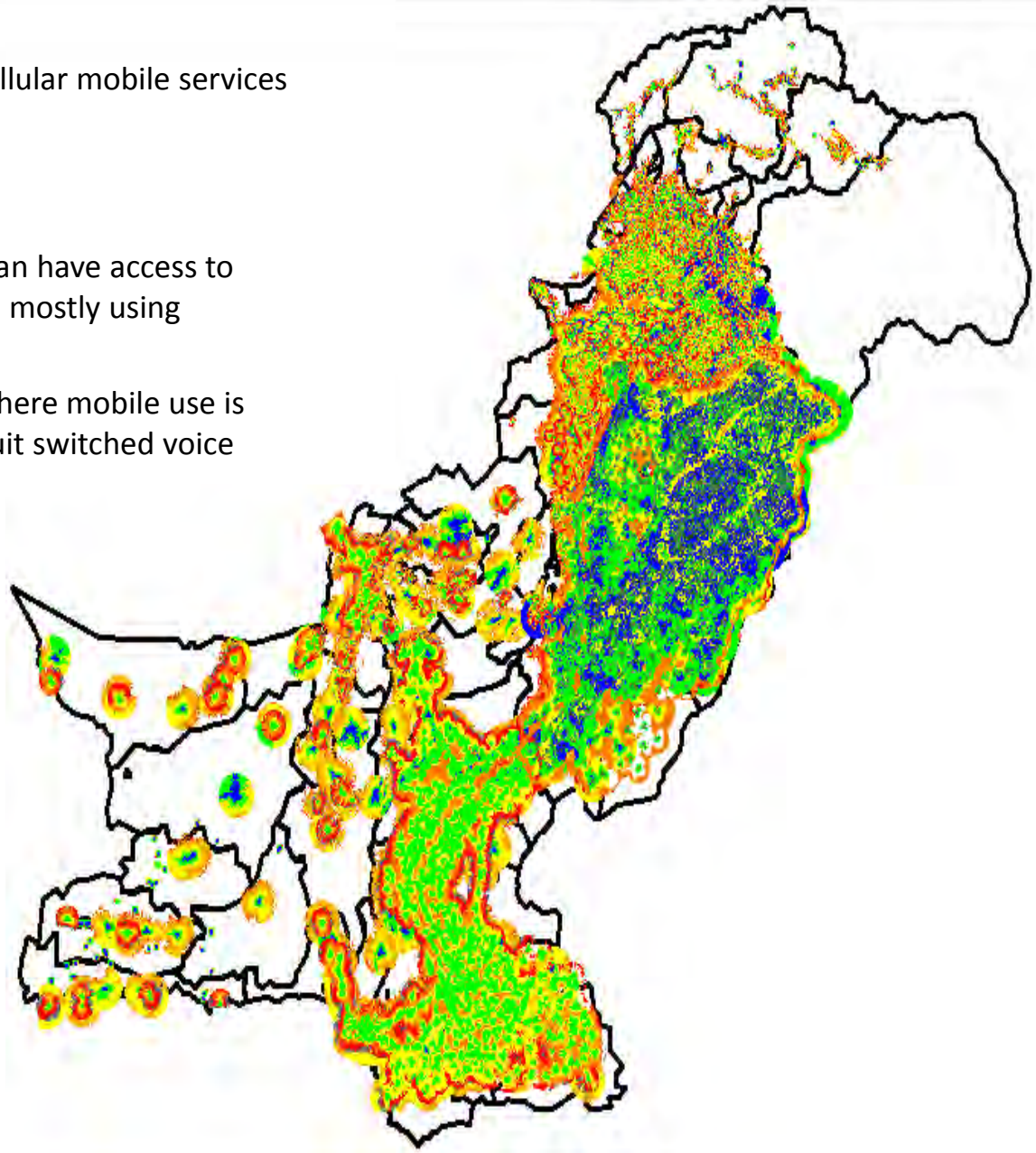
- Transparent, Competitive auction for NGMS in Pakistan.
- 10 MHz paired Spectrum in 850MHz band
- Payment terms were 100% advance or 50% advance with the rest in 5 years
- License duration 15 years

- Base Price was kept at more than the highest level of valuation of spectrum:
  - USD 395 Million for 850MHz
- PTA opted for an Open auction methodology since there was only one block on offer
- Due to equal demand and supply auction was not conducted
- Telenor was the only applicant for the spectrum
- The operator has been declared as winning bidder
- License issuance is in process

2G COVERAGE

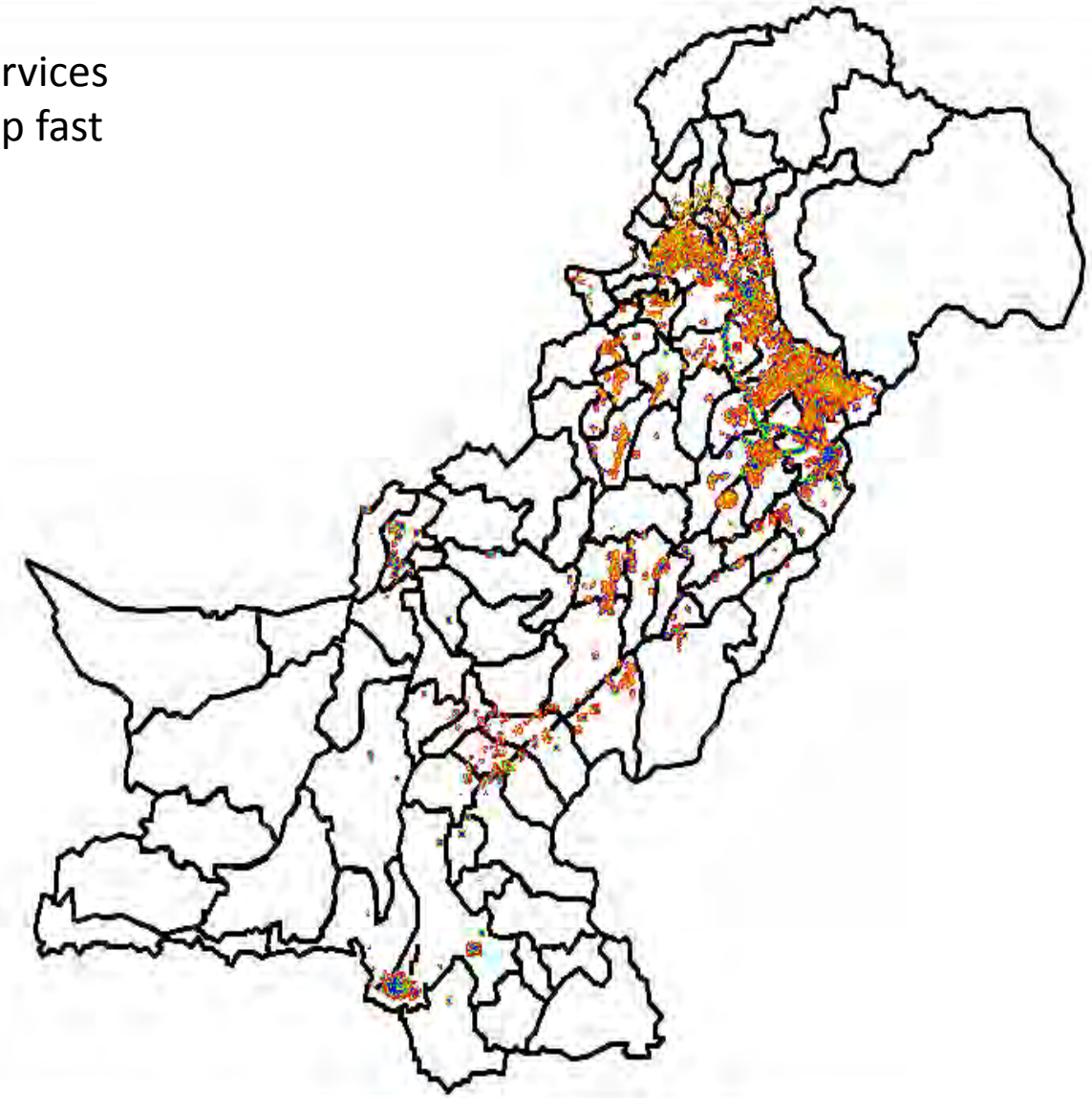
Wide-spread overage of cellular mobile services

- Most people in Pakistan have access to basic voice telephony, mostly using mobile phones
- Moving into an age where mobile use is about more than circuit switched voice and SMS
- Deployment of Fibre



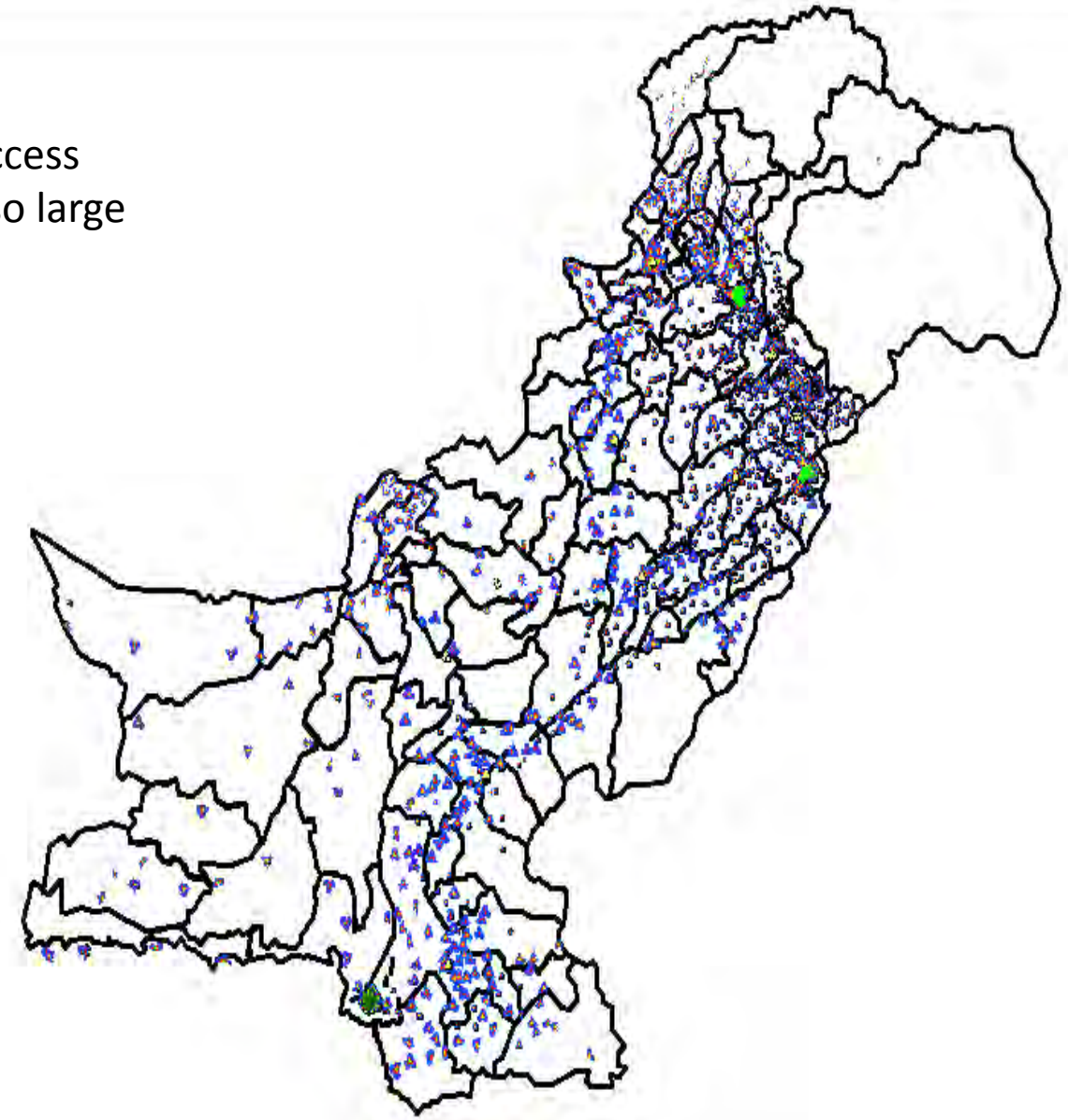
3G and 4G COVERAGE

3G and 4G services
are picking up fast



WLL COVERAGE

Fixed wireless access services have also large foot print



Current Access/Backhaul spectrum Assignments

	Access Spectrum	Backhaul spectrum
Mobile	900, 1800 , 2100 (MHz)	10/11/12/14/18/22/38/71 GHz. Spec Assigned on Link by Link basis
Wireless Local Loop (WLL)	450 MHz, 479 MHz 1900MHz, 3500 MHz,	14/15/22/23/24/38/71 GHz. Spec Assigned on Link by Link basis
Radio Base Services(RBS)	3-3000 MHz (HF,VHF UHF Above 300 MHz)	

Lessons Learned

- Sealed Bid Stage turned out to be a very good idea
- Continuous Media engagement had a positive impact
- Communication and dissemination of information on the web sites, to the courts, media and all stake holders saved us from many problems during and after the auction
- Help and advice of independent Advisory groups, knowledgeable individuals was of great help
- Good working with all relevant ministries and departments. No egos. Taking stand on important issues ONLY

Lessons Learned Contd.

- Selection of good team from within the organization strengthened by local and foreign consultants
- Continuous dialogue and meetings with potential bidders
- Transparency of the process and information availability on the web site
- Team Work (Within PTA, MoIT, MoF)
- Trust the team

Lessons Learned Contd.

- Spectrum Auction should be held as and when needed without much hype
- After all it is just leasing of spectrum for 15 years. Why waste 8 years just thinking about it
- Developed countries have allocated far more spectrum for IMT then developing countries and are reaping the benefit of doing so
- Benefit of MBB are far greater than the upfront money
- Great value of timely decisions
- Spectrum choice – Eco system and expertise

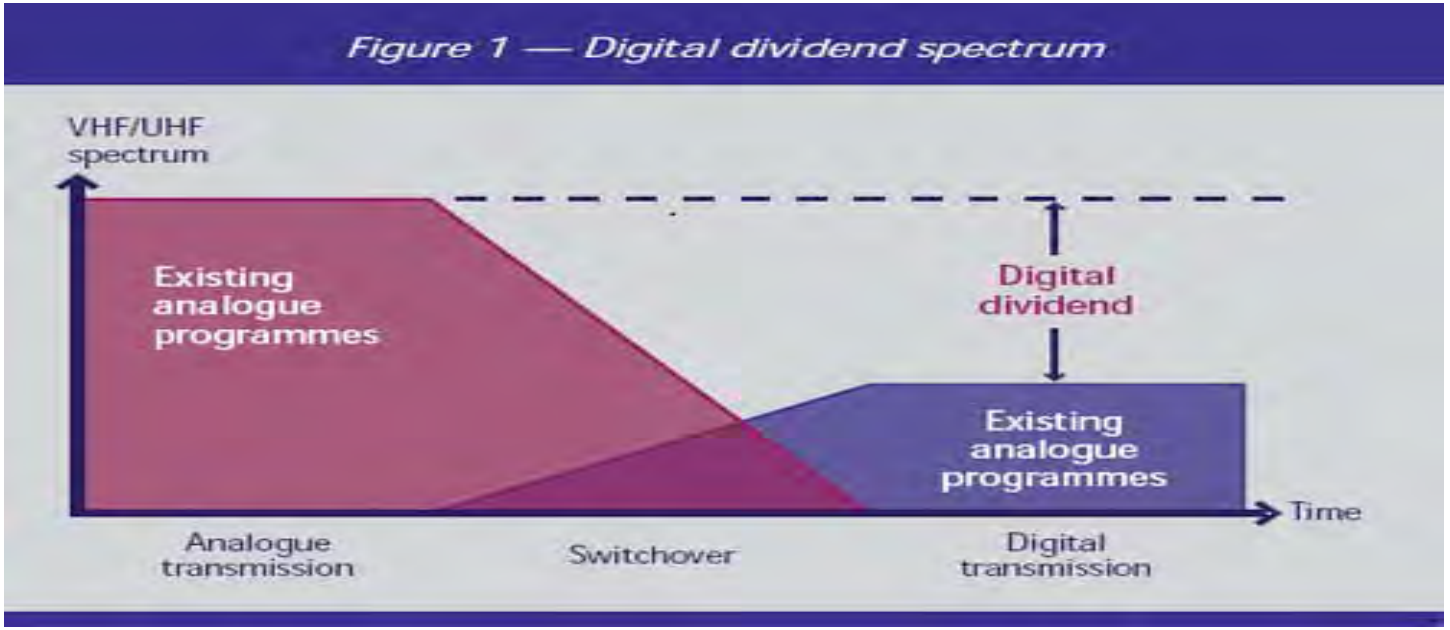
Future Frequency Assignment Roadmap

Frequency Band	Bandwidth	Status
700 MHz	703 - 748/758- 803 MHz	Under Re-Farming
800 MHz	791 - 821/832 - 862 MHz	Availability will depend on adoption of 700MHz band and PPDR
1800 MHz	1775 - 1785/1870 - 1880 MHz	Available
2100 MHz	1950 - 1980/2140 - 2170 MHz	10 MHz Available rest is under Re-Farming
2300 MHz	2300 - 2400 MHz	Under Re-Farming
2.6 GHz	2500 - 2570/2620 - 2690 MHz	Under Re-Farming

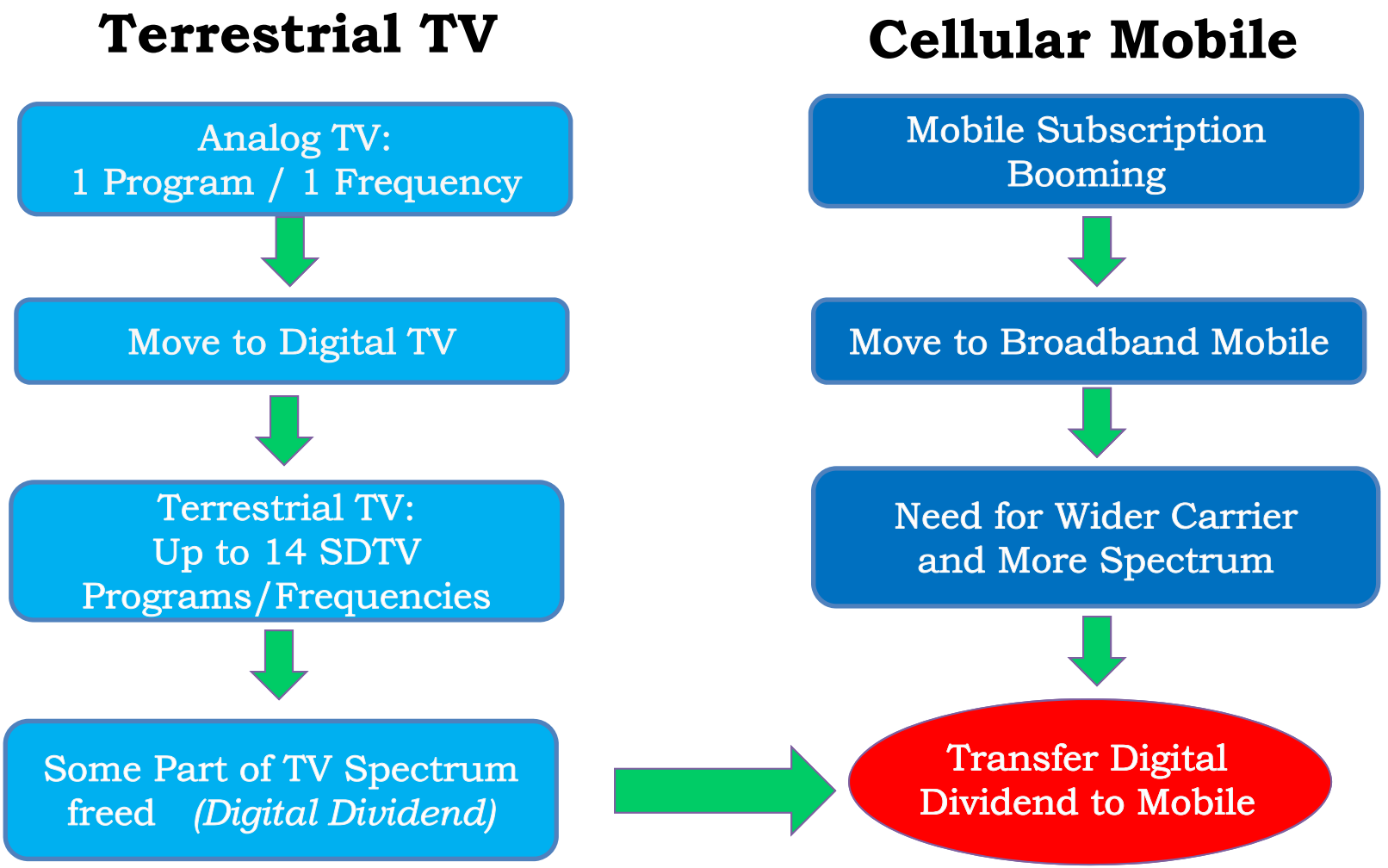
Harnessing Digital Dividend

What is DIGITAL DIVIDEND

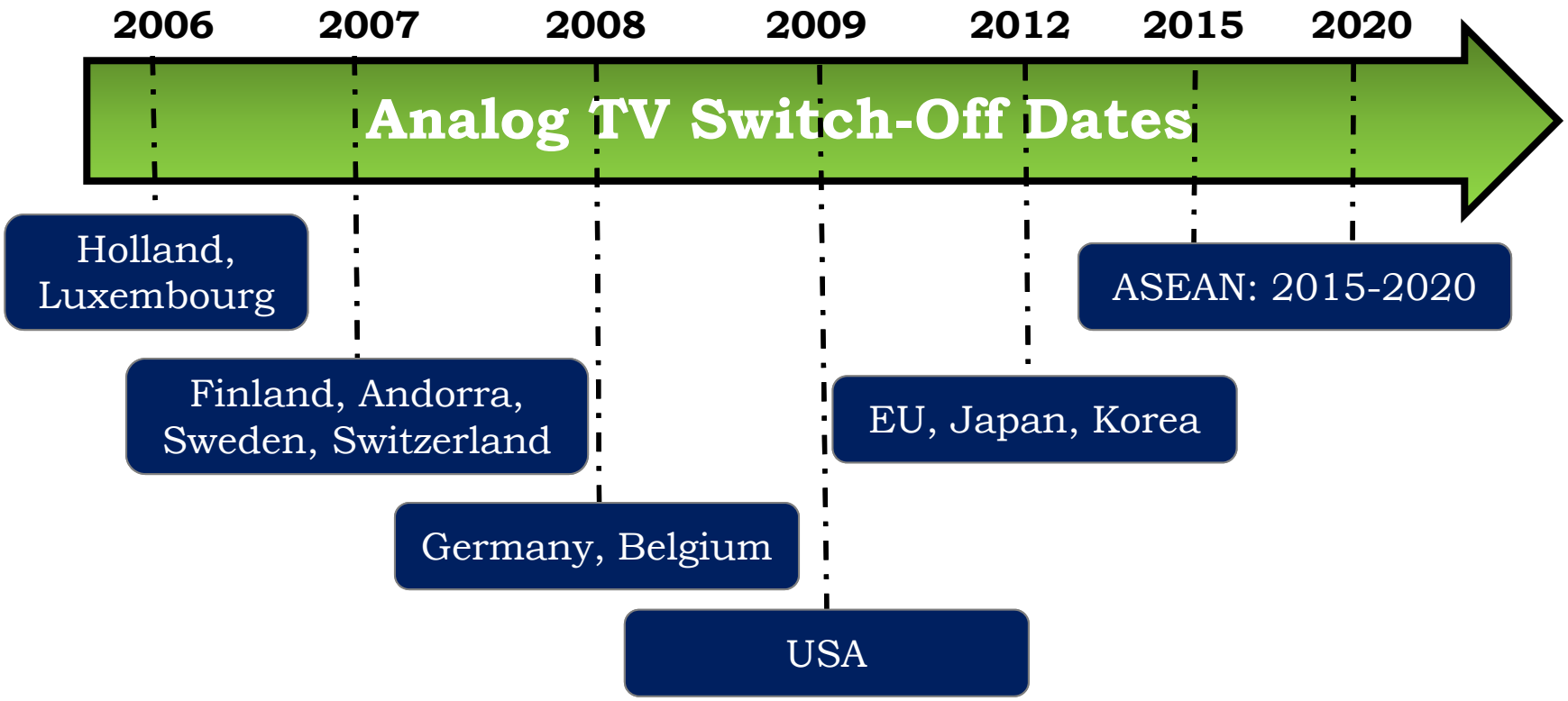
- The digital dividend is the amount of spectrum made available by transition of terrestrial TV broadcasting from analogue to digital
  - UHF band (470-862 MHz) & VHF (173-270 MHz)



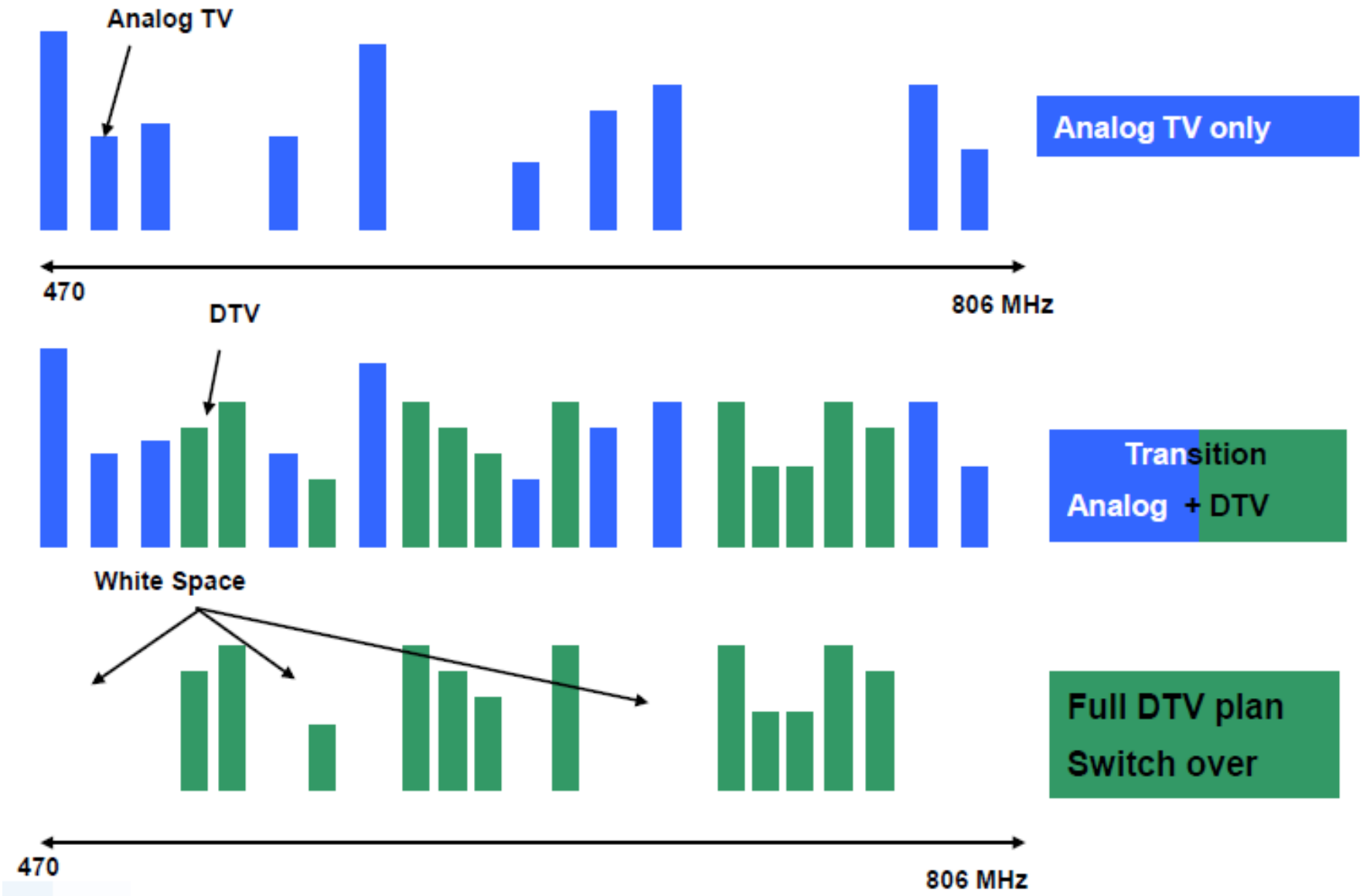
DIGITAL DIVIDEND Road Map



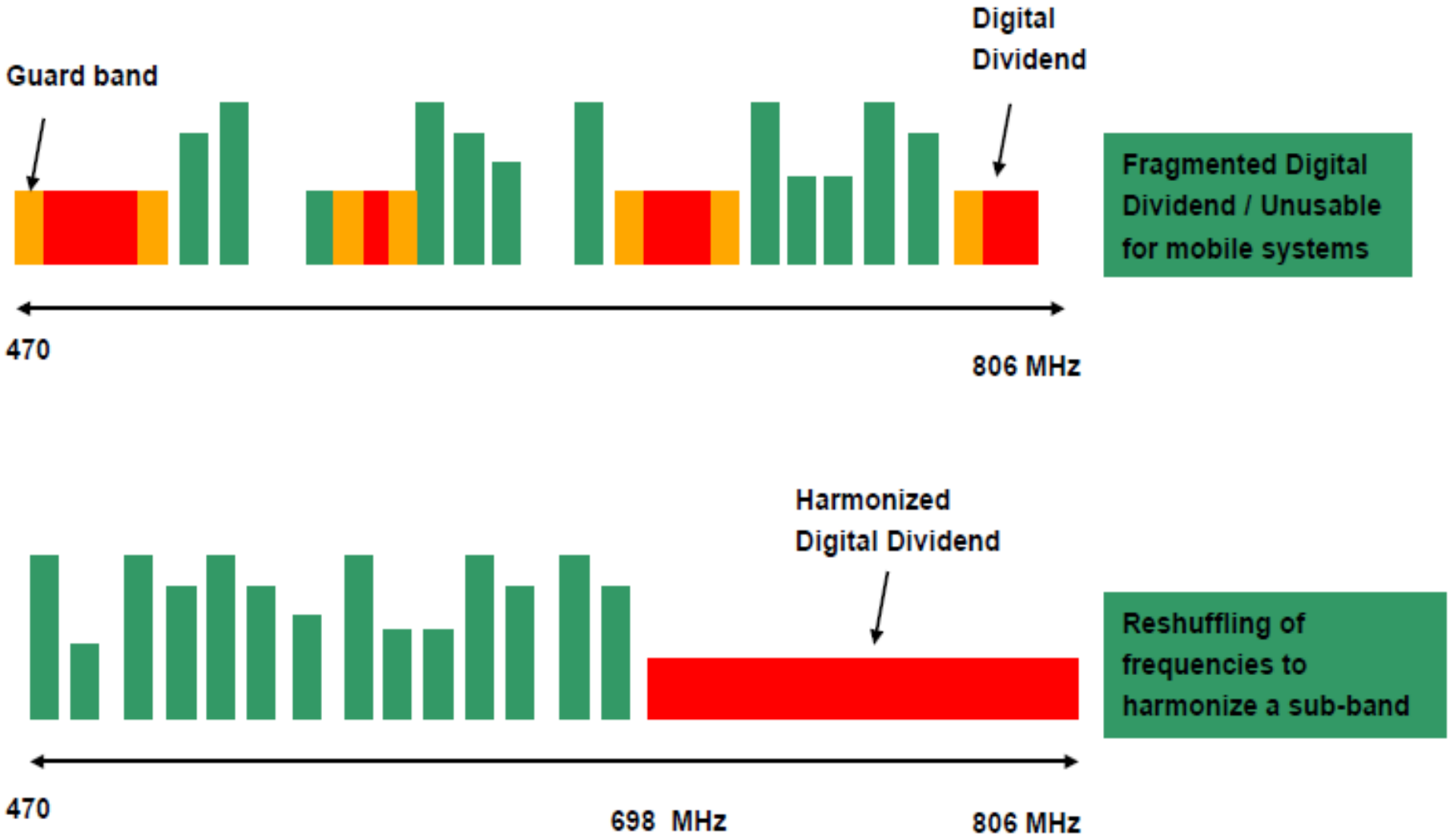
TERRESTRIAL TV DIGITALIZATION



UHF Digital Dividend



Harmonization is a Prerequisite for Mobile Services



Benefits of Harmonization

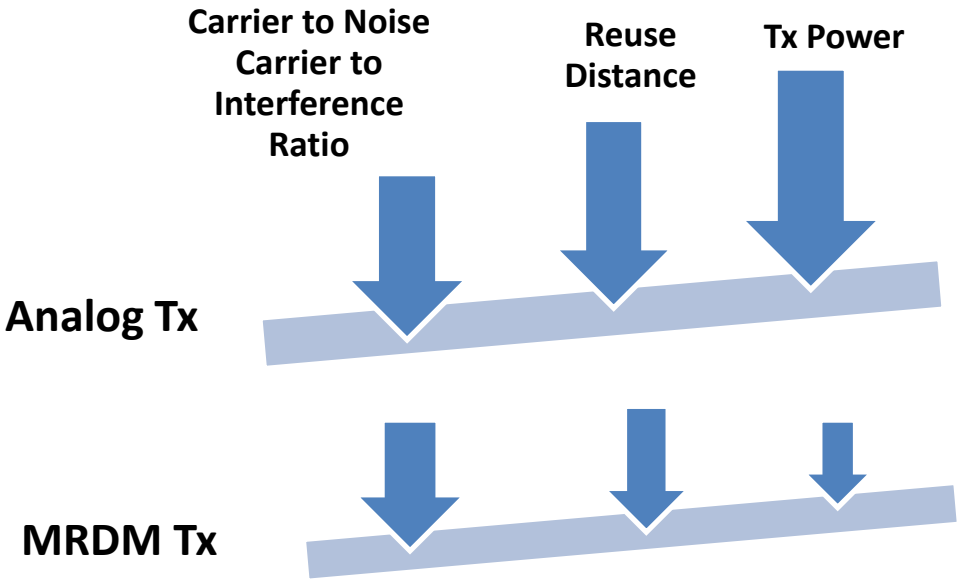
- Harmonized spectrum is a key for development of public Mobile Broadband access
  - Economy of scales (based on a mass market)
  - Easy cross border coordination
  - Cross border coordination (between countries)
  - Global roaming capabilities
  - Efficient use of spectrum

Why Switch-Over Spares Spectrum

- Digital Video Compression

01 Analogue TV Channel → **Digitization** (6,7 or 8 MHz wide Channel) → ~ 20 DTT Channels

- Multipath Resistant Digital Modulation (MRDM)



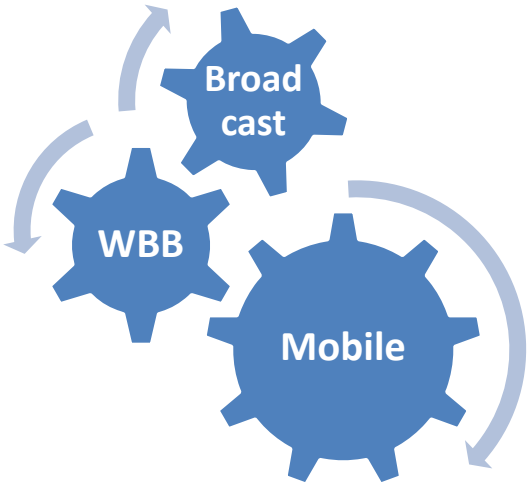
Broadcasting Gets Greener by Going Digital

What to do with Freed-up Spectrum

Potential Candidates

- Improved and new interactive television broadcasting , e.g. Mobile TV
- Mobile communications
- Wireless broadband Internet access
- Public Protection and Disaster Relief
- …

well-balanced distribution



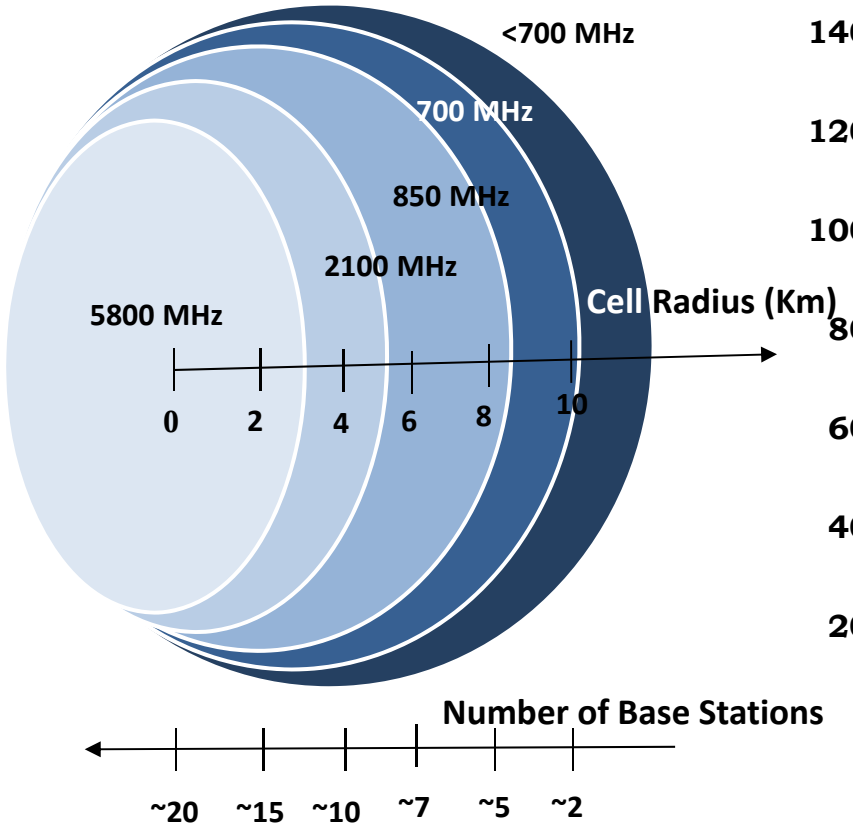
Full Social and Economic Benefits

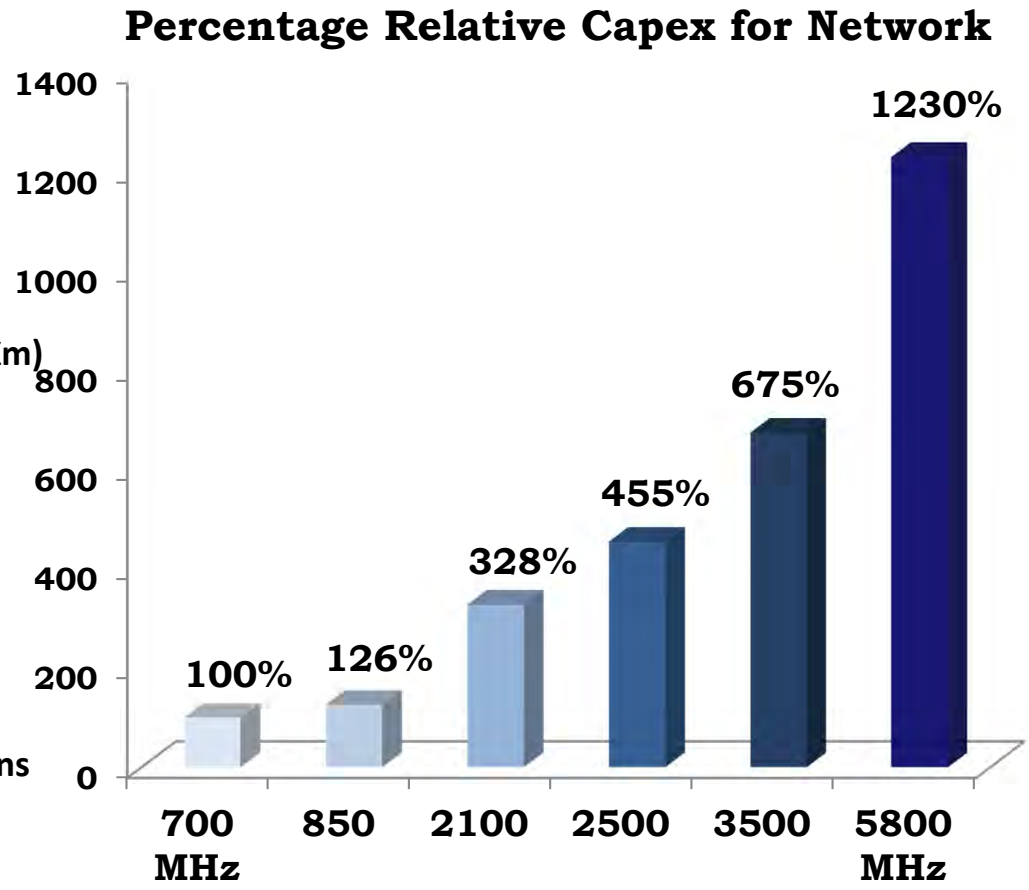
Attractive Spectrum has attracted every industry to contest

Advantages of the 700 MHz Band

- Propagation characteristics
  - Improvements in mobile broadband coverage in rural areas
  - Better indoor coverage in more densely-populated areas
  - Signal covers a larger cell size
- Infrastructure cost
  - Better Propagation means fewer base stations *(Network infrastructure is 7 times higher if wireless operators use 3.5GHz compared to 700 MHz)*

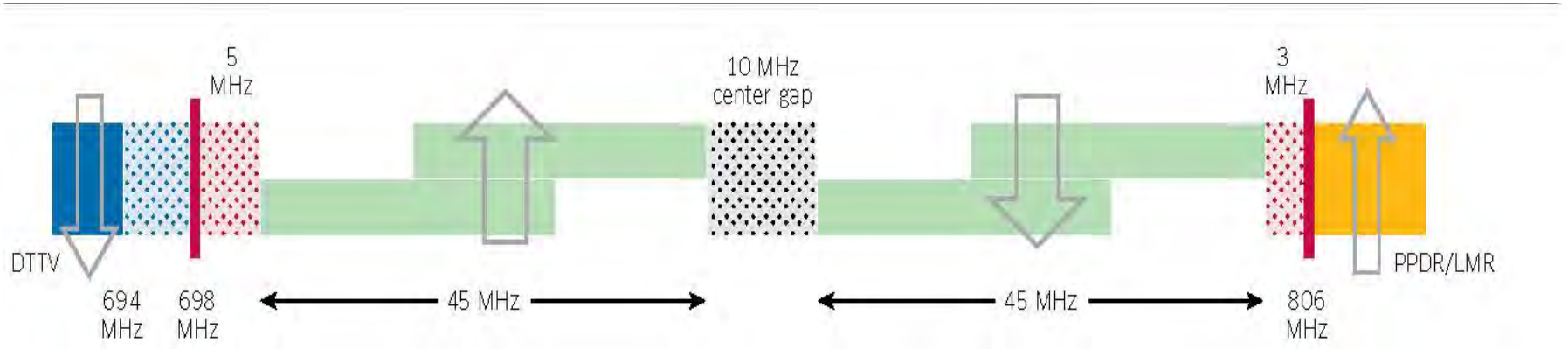
Advantages of the 700 MHz Band





APT Wireless Group 700 MHZ Band Plan

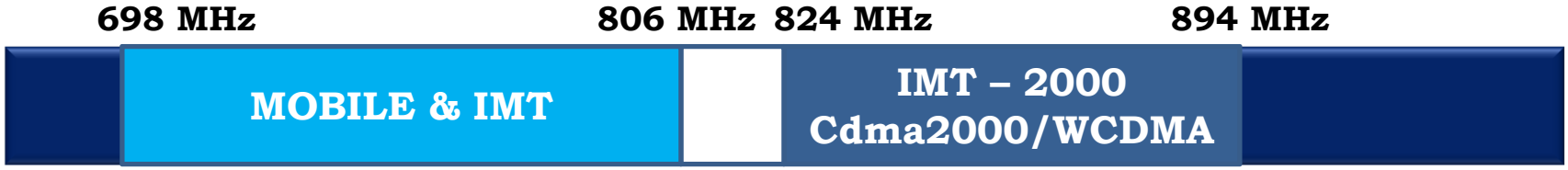
- In the Asia-Pacific Telecommunity (APT) consensus was reached in regard to the basic structure of a harmonized frequency arrangement for the band 698-806 MHz21.



Regional Spectrum Plan by ITU

698 to 960 MHz

REGION 1 (EMEA)



REGION 2 (AMERICAS)

REGION 3 (APAC)

A significant digital divide remains

6 BILLION *without* BROADBAND

4 BILLION *without* INTERNET

2 BILLION *without* MOBILE PHONES

0.4 BILLION *without* A DIGITAL SIGNAL

Divides persist between and within countries—in access and capability

SOURCE: *WDR 2016 team based on Research ICT Africa and ITU data*

The Economics value of Spectrum

Supply and Demand of Spectrum

- Supply of spectrum is managed by government, either directly or through agencies.
- Access to most frequency ranges, however, is closely regulated and in some cases frequencies are assigned to specific users on an exclusive basis.
- Spectrum managers want optimum spectrum occupancy and effective frequency utilization.
- Innovations affect the extent to which spectrum can be utilized. The technological advancements have made it feasible for higher spectrum to be used at lower costs.
- The demand for spectrum in certain bands has grown markedly.
- The willingness of users to pay for certain spectrum impacts the

Pakistan's Spectrum Supply Roadmap

Band (3GPP designation)	Frequency Range (Uplink)	Bandwidth available	Region	Deployment Level
Available in Pakistan for Auction				
1800 (Band 3)	1755.9 – 1765.9	2x10MHz	Global	HIGH
850(Band 5)	824 – 834	2x10MHz	Global	HIGH
Available in Pakistan in next 2 years				
1800 (Band 3)	1765.9 - 1785	2x19.9MHz	Global	HIGH
2100 (Band 1)	1950 – 1980	2x30MHz	Global	HIGH
Sub-Total, MHz	**2x79.9**			
Future Consideration (one of the two)				
700 (Band 28)	703 – 748 (758 – 803)	2x45 MHz	APT	Will be high due to significant support
Sub-Total, MHz	**2x45**			
Total, MHz	**2x124.9**			

Estimated Spectrum Demand Scenario in Pakistan

Operator	Current total holding, MHz	Spectrum Demand (approximate) pre 2020 , MHz	Operators Spectrum Shortage, MHz (Approximate)
Mobilink + Warid (40%)	37.2	**47**	10
Ufone (20%)	18.6	**22**	4
Zong (20%)	33.6	**22**	0
Telenor (30%)	18.6	**35**	17

Value of Spectrum

- The value of spectrum is reflected in two inherent rents: scarcity rent and differential rent.
- **Scarcity rent** exists because demand for spectrum, at least in certain bands and at certain times, exceeds supply at zero price.
- **Differential rent**: Each frequency band possesses specific propagation characteristics that make it suitable for specific services. Having access to the most suitable band minimizes the cost.

National Goals for spectrum distribution

- Efficient and productive usage of the spectrum resource
- Rapid and effective introduction of a new wireless technology
- Development of wireless service in remote, rural or low-income areas (i.e., universal access)
- Goverr

Assess and weight each national goal to be achieved via a spectrum distribution

Determining Value of Spectrum

- Assess the market (i.e., how many licenses to distribute, how much demand is there from operators, etc.)
- Assess non-economic market factors (i.e., geographical, political, regulatory, competition policy etc.)
- Determine assignment method – auction, administered pricing or no-fee distribution
    - Set a potential price floor or expected bid level

Spectrum Value: *four fundamental questions for the investor*

- How much spectrum is needed vs. what is being auctioned?
  - ✓ An assessment of spectrum need in the context of the growth in demand, notably mobile broadband and taking into account overall strategy including alternatives, e.g. data offload through Wi-Fi and the fixed network.
- How much is it worth vs. cost of alternatives?
  - ✓ Valuing each spectrum block to set the bid limit for the auction.
- How strategically important is it to acquire a spectrum block?
  - ✓ To prevent damaging future market share?
- What are the impacts of the auction format?
  - ✓ Depending on the auction format there may be an opportunity to influence the outcome, i.e. acquire it as cheaply as possible

Spectrum Value: Key Drivers

- **Incremental revenues and NPV**: MNOs will evaluate if the decision to buy additional spectrum, and the associated price is suitable to the overall business value.
- **Competitor response**: MNOs will evaluate the need for, and value of spectrum based on their need to respond to competitive offerings that affect market share
- **Network Capex trade-off**: MNOs will evaluate network cost savings from deployment of additional spectrum as compared to increase in number of sites, and
- **Alternate options**: MNOs will evaluate options such as re-farming

Valuation Approaches

Cost Avoidance Model:

- This model aims to identify with the operator decision-making process to purchase additional spectrum.
- Operators would consider the business case of purchasing additional spectrum only if it is of benefits for their business plan – such incremental benefit will come from a reduction in capacity sites from deployment of additional spectrum, as well as an upside from participating in the market of advanced broadband technologies
- The model uses the current financial structure of MNOs and factors in the impact of taxes and duties within their current profitability and returns structure used for estimating Net Present Values (NPVs).

Re-farming NPV

- MNOs also have the option to re-farm their spectrum holdings for advanced services, and the incremental NPV is estimated from this option. NPV upside from this approach is used as a reference point to estimate the overall value of the spectrum.

Valuation Approaches

Auction Benchmark

Two approaches for benchmarking:

Benchmarks based on previous auctions in the country. This is based on using market determined price from relevant spectrum auctions held earlier, and use the relative economic efficiency factors to arrive at benchmark values.

Benchmarks based on related auctions for other markets.

Designing An Auction

- ❑ Draft rules for use of the spectrum (license parameters, technology neutrality)
- ❑ Set license terms and conditions (regulatory fees, term limits, renewal criteria)
- ❑ Set auction rules
  - ✓ Consider spectrum distribution goals
  - ✓ Consider steps to curb collusive behavior
- ❑ Draft prospectus materials covering full range of spectrum and market environments – Conduct operator outreach activities such as road shows, visits and responses to queries

Designing An Auction

- Pre-qualification : Establish bidder criteria in a clear and open manner – Publish pre-qualification criteria as part of the solicitation of bids.
- Any failure to adhere scrupulously to published, transparent pre-qualification criteria will undermine the auction's credibility
- Employ neutral, professional auction specialists to design and operate the auction – Design and installation of auction software and hardware is vital to the integrity and effectiveness of the auction. – Develop security and cyber-security of the auction facilities
- Develop contingency and troubleshooting plans
- Formulate and publish policies and rules for payments (including any installment payment plans) well in advance – Determine and publish penalties and policies for auction payment defaults

Best Practice: Test end-to-end auction procedures, systems, and technologies used

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THANKS!