Trends in Spectrum Management:
Spectrum Economics and Estimation
A Case Study on Bangladesh

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Aim:

To provide a comprehensive idea about the economic aspects of spectrum management on the context of Bangladesh.

Scope:

a. **Telecom Sector – At a Glance**
b. **Spectrum Economics: Systems of Spectrum Charging, Auction Experience**
c. **Current Utilization and Demand for Spectrum**

Basic Economic Stats

Land Area: 147,570 sq.km

Population:156.4 M

ICT Profile of Bangladesh	Statistics
1. Name of the Policy Maker	MoPT and IT
2. Name of the Telecom/ICT Regulator	BTRC
3. Name of Chairman of BTRC	Dr Md Shajahan Mahmood
4. Legal Document Creating the regulator	BTR Act 2001
5. Budget Approving Authority	MoF
6. Sources of Regulator's Budget and % financed from each source	a. Award/auction of mobile license, 1.05% b. License fees, 2.06% c. Fines/Penalties, 0.032% d. Contributions from regulated telecom operators based on turnover, 48.89% e. Others, 1.72%
7. Definition of BB	5 Mbps
8. Fixed-Telephone Subscriptions	1138946
9. Mobile Phone Subscriptions	116871000
10. Fixed BB Subscriptions	989521
11. Mobile Broadband Subscription per 100 inhabitants	13.4
12. Households with a computer	8.2%
13. Households with Internet access at home	11%
14. Internet Density	27%

Spectrum Economics: Systems of Spectrum Charging in Bangladesh

Spectrum Assignment Practice in Bangladesh

Spectrum auction took place twice in Bangladesh: once back in 2008 while awarding licence to BWA operators and for the second time in 2013 while awarding license for 3G

Over the counter allocation is the frequently used method for assigning spectrum for most of the services in Bangladesh

Why Put A Price on Radio Spectrum?

Radio communication plays a significant role in the development of almost every sector of the country – this makes radio specturm a valuable natural resource.

To ensure efficient use of spectrum.

To recover the 'Administrative Cost' of spectrum management.

To meet the budgetary objective.

To ensure affordable availability of communications service.

The ITU-R report "Economic Aspects of Spectrum Management" notes that as the owner of the spectrum, the State has the right to require private occupants of the spectrum to pay fees. [1]

1.Source:*Report ITU-R SM.2012-3, Economic Aspects of Spectrum Management, September 2010, pages 13-14..*

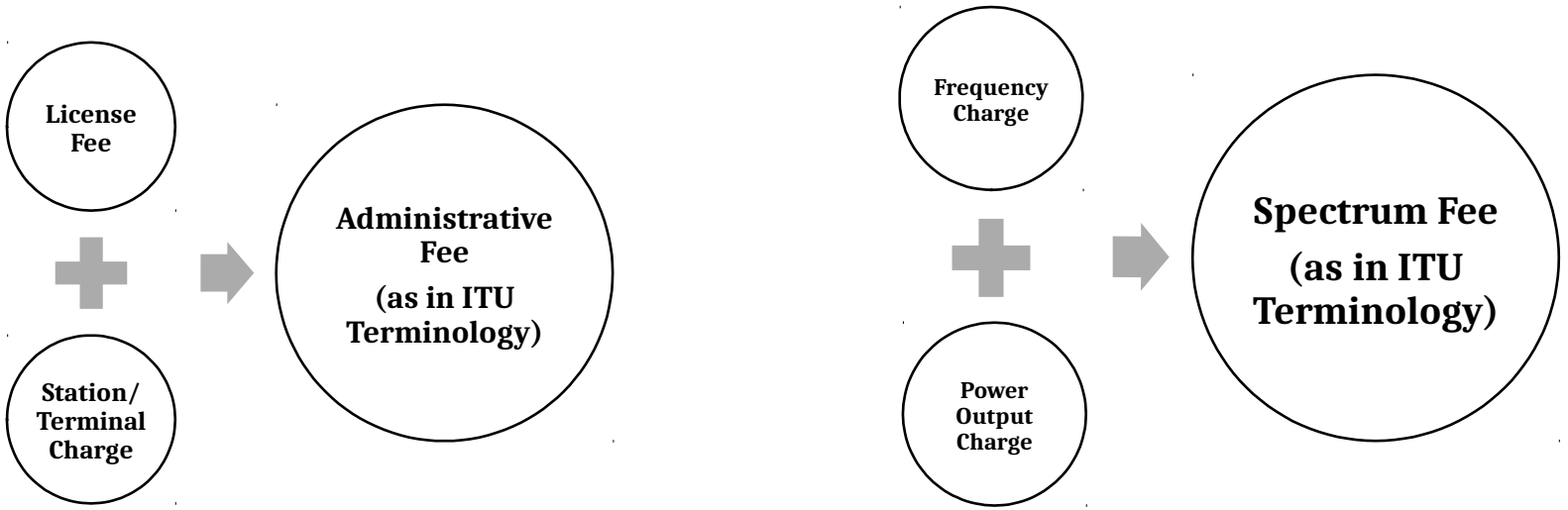
Methodology of Charging for Access to Spectrum

- A ‘Rate List’ is available for most services outlining Radio Frequency Charges, with four main components covering frequency, power output, station terminals and a license fee;
- A ‘Formula’ based approach for calculating spectrum access fee for cellular mobile, broadband wireless access and PSTN operators.
- In some case there are other one-off charges associated with the issue of new licences.
- Applicants must pay a fee for the Application Form currently 500 Taka (USD 4.5, approx).
- Application Processing Fee of 5000 Taka (USD 62 approx) is payable at the time of submission on application.

Rate List

- Frequency Charge: Depends upon the amount of frequency used, the band and the nature of the service;
- Power Output Charge: Is a separate charge bases on the power of transmitters (varies according to the band as well);
- Radio Station/Terminal Charge: For certain types of equipment, in addition to or instead of the above charges;
- License Fee: Amount of 100 Taka = USD 1.2, approx .

The system is a bit difficult to understand especially the liability for each type of category.



According to ITU principles, 'Administrative Fees' should resemble costs but in our case 'Station/ Terminal Charge' cannot be assumed as a cost.

Services Charged According to Rate List

Service Name	Exemption
Television Broadcasting	Frequency Charge, Power Output Charge
Sound Broadcasting (FM/ AM)	Frequency Charge, Power Output Charge
Aeronautical	Frequency Charge, Power Output Charge
LMR/ PMR	No Exemptions
Maritime	Frequency Charge, Power Output Charge
Amateur	Frequency Charge, Power Output Charge, Station Charge
V-SAT	Frequency Charge, Power Output Charge

Like many other countries Bangladesh also partially or fully exempt certain users from paying fees.

Most commonly, exempt users include government agencies and public safety agencies (such as police, fire brigrade and defence agencies services).

Formula Based Approach

Spectrum Charges in Taka = STU x CF x BW x AF x BF

where:

STU is the Spectrum Tariff Unit, currently set at 70 Taka (less than a dollar);

CF is the Contribution Factor, varies with the subscriber base of the operator (the more subscribers, the higher the CF);

BW is the assigned bandwidth in MHz;

AF is the Area Factor (which in practice is set at 134,275 representing the surface area of Bangladesh (in square kilometres) for point to multipoint services and at an amount reflecting the square of the hop length for point to point services used by these operators); and

BF is the band factor, which varies according to the band of the service in question.

Applicable for:

- **Cellular Mobile**
- **PSTN**
- **BWA**
- **DTH**

Other Fees

Category	Charge
Annual License Fees	Fixed Fees (e.g BDT 50 M for cellular mobile operators)
Revenue Sharing	Applicable to mobile operators (5.5% of Annual Audited Gross Revenue) and BWA operators (exempted for the 1st Year, 2 % of Annual Audited Gross Revenue in the 2nd year, and 4% in each subsequent year.
Social Obligation Fund	3G Op are also required to pay 1% of annual audited gross revenue to fund telecom infrastructure in underprivileged areas.

Spectrum Economics: Our Auction Experience

Facts and Figures of BWA Spectrum Auction held in 2008

Available Spectrum	**2x35MHz in 2.3GHz Band** **1x35MHz in 2.5 GHz Band**
License Period	**15 years up to 2023**
Tech Neutrality	**Yes**
Payment Terms	**50% of total within 10 working days** **Rest 50% of total in 90 days.**
Base Price	**3.7M USD**
Eligibility Condition	**New entrants.**
Auction	**Open Out Cry method**
Govt Realized	**64M USD**

Facts and Figures of 3G Spectrum Auction held in 2013

Available Spectrum	**40 MHz in 2100 MHz for 3G license**
License Period	**15 years upto 2028**
Tech Neutrality	**Yes**
Payment Terms	**60% of total within 30 days** **Rest 40% of total in 180 days.**
Base Price /MHz	**20M USD**
Spectrum Cap	**15 MHz per operators**
Eligibility Condition	**Existing cellular mobile operators and new entrants. No new entrant showed up.**
Auction	**Open Out Cry method with bid increment of 0.5 M USD per bid. Auction ended with two rounds.**
Govt Realized	**525 M USD**

Difficulties of Spectrum Auction in 2013

- Lack of interest from Operators.
- Absence of specific instruction for the Operators to hold specific amount of spectrum for ensuring QoS.
- No competition.

Concerns for Up-coming Auctions

- Tech neutrality is planned to be declared at 900, 1800 MHz for which a pricing committee is formed for declaration of appropriate base price.
- Fixation of base price for the existing tech specific spectrum that is potential to be declared tech neutral remain as one of the responsibilities of the committee.
- Compulsory FDI is a concern from the Operators.
- Periodical consultation, workshop, seminars are being arranged.

Spectrum Estimation: Current Utilization and Demand

Cellular Mobile and Mobile Broadband Service

Spectrum Band	Current Utilization	Current Demand
800 MHz	Mostly assigned to two mobile operators (CDMA and GSM) and PSTN operators	Low
900 MHz	Assigned to three mobile operators	Medium
1800 MHz	Assigned to four mobile operators, one PSTN operator and one government user	High
2100 MHz	Assigned to four mobile operators through an auction	Medium
2300 MHz	Assigned to one BWA operator and to one ISP	Low
2500 MHz	Assigned to BWA operators and government user	Low

LMR/PMR Service

Spectrum Band	Current Utilization	Current Demand
Below 380 MHz	**Assigned to Private and Government Organizations for PMR and Trunked Radio Service**	Medium
380 – 390 MHz / 390 – 400MHz		Medium
406.1 – 410 MHz		Medium
410 – 430 MHz		Medium
470 – 490 MHz		High
490 – 510 MHz		High
520 – 522 MHz		Medium

Broadcasting Service

Spectrum Band	Current Utilization	Current Demand
87-108 MHz **174-230 MHz**	29 FM and 19 Community Radio Operator 1 National Terrestrial Broadcaster	High
5.85-6.425 GHz	37 Satellite TV Broadcaster	Medium

Aeronautical Service

Spectrum Band	Current Utilization	Current Demand
117.975 – 137.175	30 Airlines are using this spectrum band	Medium

Maritime Service

Spectrum Band	Current Utilization	Demand
405 – 512 KHz 2000 – 2850 KHz 4000 – 4438 KHz 6200 - 6525 KHz 8100 - 8815 KHz 16360 - 17410 KHz 18780 - 18900 KHz 19680 - 19800 KHz 22000 - 22855 KHz 25070 - 25210 KHz 26100 - 26175 KHz 156 – 162 MHz	Around 300 licensees are using these spectrum bands	Medium

Satellite Service

- Bangabandhu Satellite – the first satellite carrying Bangladeshi flag is planned to be launched at the end of this year.
- C and Ku band transponders will be mounted in this satellite.
- Earlier, C and Ku band frequencies were assigned to cellular mobile operators and other government agencies for fixed point to point services.
- As sharing of spectrum between satellite downlink and terrestrial fixed services is not recommended, re-farming of these bands is currently under consideration.

Future Concerns

- Use of reliable ‘Cost Accounting’ method to establish the cost of managing spectrum.
- Review the current spectrum charging system using ‘Rate List’.
- Put emphasis on ‘Auction’ mechanism while assigning spectrums of high demand.
- Design spectrum auction modality and pricing in such a way so that the operators are encouraged to take more spectrum with lesser price rather than lesser spectrum with more price.
- Provide flexibility in terms of technology usage in IMT bands.
- Estimate future requirement of spectrum for various services.
- Revoke long term unused spectrum from PSTN, ISP operators and use those for future IMT deployment
- Not to assign fixed links, mobile backhaul etc. in the overlapping bands between satellite and fixed services.

Thank you