Workshop on Economic Aspects of Spectrum Management

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1. General Overview

- **Official Name:** Kingdom of Cambodia
- **Capital City:** Phnom Penh
- **Landmass:** 181,035 Square Kilometers
- **Location:** Southeast Asia, bordered by
  - Thailand to the Northwest,
  - Laos to the Northeast,
  - Vietnam to the East,
  - the Gulf of Thailand to the Southwest.
- **Population:** 14 million (estimated in 2013).
- **Religion:** Buddhism.
- **Currency:** Riel
- **Contribution of GDP:** Industry 40%, Service 30%, Agriculture 30%
2. MPTC’s Structure
3) Legal and Policy Framework

- Adopted in 2015
- Regulating Telecommunication Industry
- Role of MPTC and TRC
- Foundation and principles for establishing regulations on Licensing Regime, spectrum, Numbering Plan, IP and Domain name, QoS and...
# Legal and Policy Framework

<table>
<thead>
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<tbody>
<tr>
<td>• Adopted in 2016</td>
<td>• ASEAN ICT Master Plan 2020</td>
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<tr>
<td>• Roadmap for Telecommunication and ICT Development</td>
<td>• ITU Connect 2020 Agenda</td>
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<tr>
<td>• Providing guideline and principle for Broadband policy</td>
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Legal and Policy Framework

- Ministry of post and telecommunication is frequency spectrum policymakers: organize spectrum regulation, national spectrum plan, frequency table of allocation, band plan.
- Telecom regulator of Cambodia issue spectrum license, apparatus license and enforce licensing condition. Monitoring frequency spectrum use.
- Spectrum auction required for spectrum license for mobile phone. Auction is co-organized by MPTC and Ministry of Economics and Finance.
- Spectrum regulation is drafted and consulted with private sector.
Legal Framework *(Telecom. Law)*

- **Article 47:** [...] Radio frequency spectrum shall be under the management competence of Ministry of Post and Telecommunications (MPTC). [...]  
  - **Article 48:** MPTC shall plan national radio frequency spectrum. [...] T.R.C. shall issue relevant regulations of settlement from license holders for using this radio frequency in line with the Prakas of MPTC. [...]
4. Spectrum Management Status

Radio Frequency Allocation

International Allocation

✔ ITU Radio Regulations: Article 5 (Frequency Allocations)
✔ National Frequency Allocation Table.
National Spectrum Licensing Workflow

Applicants

License Request → Registration → Administrative study → Checking In Data List → License & memo → MPTC

Frequency is not available → Rejection

Invoice (Application and Inspection Fee) → Invoice
Radio Frequency Assignment Methods

1- T.R.C. selects frequency and assigns it.

2- Applicant selects frequency, T.R.C. will verify and assign it.

3- T.R.C. certifies private entity to assist applicants in frequency selection, T.R.C. will verify and assign it.
Management on Radio Digital Microwave Network
Management on Radio Digital Microwave Network
5. Telecommunications Status

- Network & Service Licenses

- Submarine Cable Network
- Mobile Operators
- Fixed Operators
- Optical Fibre Network
- Tower Sharing
- ISP

- International Telecom Gateway
- VSAT
- Toll Free
- Directory
- Value Added Service
- Voice over IP (VoIP)
Telecom Operators & Market

- Mobile subscription: **19.17 millions Subs.** (SIM)  
  Penetration: **130 %**

- Fixed and Fixed WLL: **234,799 Subs.**  
  Penetration: **1.60 %**

- **Total tele-density**: **150.92%**

- Internet user: **7,25 millions users**  
  Penetration: **46.4 %**
Telecommunications Status

![Graph showing subscription by services from Y2008 to June-2016. The graph indicates steady growth in mobile, fixed (wireline/WLL), and internet (Mobile/Fixed) subscriptions.](image)

- **Mobile**: 3,791,834 in Y2008, increasing to 20,264,514 by June-2016.
- **Internet (Mobile/Fixed)**: 10,537,628 in Y2008, growing to 20,331,434 by June-2016.

The graph is titled "Subscription by Services" and shows the trends of mobile, fixed, and internet subscriptions over the years from 2008 to June 2016.
Telecommunications Status

PENETRATION BY SERVICES

- Mobile
- Fixed
- Internet (Mobile/Fixed)
# Fiber Optic Cable Infrastructure

<table>
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<tr>
<th>Company</th>
<th>Length Optic Cable</th>
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<tbody>
<tr>
<td>CFOCN</td>
<td>17,200 km</td>
</tr>
<tr>
<td>Viettel (Cambodia)</td>
<td>8,300 km</td>
</tr>
<tr>
<td>Telecom Cambodia</td>
<td>1,600 km</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>27,100 km</strong></td>
</tr>
</tbody>
</table>
Purpose of Frequency Management

To provide for the efficient and effective use of the scarce national spectrum resources through

- Planning, regulating and managing the efficient allocation of national resources
- Planning and coordinating of frequency usage at regional and international levels
- Monitoring and resolving radio frequency interference
National Frequency allocation Table

- Referring to Radio Regulations Article 5 of ITU edition 2012 (region 3) TRC has allocated frequency from 8.3kHz to 275GHz for services as following:
  - Fixed
  - Space
  - Mobile (Private Network, Aircraft Station, Ship Station, Cellular Telephone, Trunked Radio)
  - Broadcasting
  - Amateur Radio
  - Radio determination ect...
Spectrum Management

Why Spectrum Management Is Essential: Spectrum Management is essential to achieve the 3 main goals of Government:

1. Social Economic Benefit
2. National Security
3. National Budget

Three main means to achieve the above vision: Harmonization, Efficiency and Availability of Spectrum
Technology & Frequency Band Assign
For Commercial Operation in Cambodia

1) CamGSM
   EGSM900/GSM900/GSM1800/W--CDMA2100/BWA(WiMAX)/Optical Fiber/Microwave

2) Camintel
   WLL (Fixed Phone)

3) CADCOMMS
   WCDMA2100/3G/Optical Fiber/Microwave

4) SEATEL
   CDMA800/Optical Fiber/Microwave

5) Smart Axiata
   GSM900/GSM1800/WCDMA2100/LTE/4G/BWA(WiMAX)/Optical Fiber/Microwave

6) Vieael(Cambodia)
   EGSM900/GSM900/GSM1800/WCDMA2100/LTE/4G/BWA(WiMAX)/Optical Fiber/Microwave

7) Xinwei
   TD-SCDMA

8) ChuanWei, EMAXX
   LTE (Not yet in operation)
The frequency below 1GHz assigned to operators:

- 138 – 174 MHz: PTT users (Radiocom).
- Band: (III) 174 – 230 MHz, (IV) 470 – 606 MHz, (V) 606 – 790 MHz: ATV/DTV, broadcasting stations (TV).
- 430 – 470 MHz, Assigned to PTT users, (CDMA450: 450-470MHz).
- APAC 700 MHz (698 – 806MHz) APT Band Plan for Mobile Broadband service.

The Frequency above 1GHz assigned to operators

- 1800 MHz, 1900 MHz, 2100MHz: GSM, LTE, WCDMA.
- 2300 – 2400 MHz: 03 ISP operators for operating WiMAX technology.
- 2400 – 2483MHz: ISM.
- 2500 – 2690MHz: 04 LTE operators (Only one operator has deployed)
- 3300 – 3400MHz: 08 operators for operating BWA.
- 3400 – 4200MHz: C-Band (Fixed Satellite Service)
- 5230 – 5825MHz: 07 operators for operating BWA/Backhaul.
- 7300 – 23000MHz: Mobile operators for operating Radio Microwave Link.
Cooperation Frequency Assignment & usage

There are four relevant Ministries as the following:

1- **Ministry of Information** is responsible for TV & sound Broadcasting
   - Sound Broadcasting:
     - AM, SW has been allocated 535-1606.5kHz(CBG-7) & part of HF band
     - FM has been allocated 87 – 108 MHz(CBG 21)

   - TV Broadcasting: The situation in these band with regard to digital dividend in Cambodia is summarized in Table: **Broadcasting and Mobile Internet in Band I, III and IV/V**
Cooperation Frequency Assignment & usage

2- **Ministry of Interior** used frequency band HF, VHF & UHF for Radiocom (Push To Talk) and Radio trunked system.

3- **Ministry of Defense used** frequency band HF, VHF & UHF for Radiocom (Push To Talk)

4- **Secretary of State of Civil Aviation (SSCA)**: Operation frequency band and application:

I- Navigation System: MF, VHF & UHF band for operation NDB, VOR, DME, VDF, ILS, DME...

II- Communication: VHF Airband, VHF G/Ground, HF G/Ground(USB), SAT.COM and Trunked Radio (UHF 800MHz Band)

III- Surveillance: Interrogator and SSR Monitor (1030MHz & 1090MHz)
<table>
<thead>
<tr>
<th>Type of Licenses</th>
<th>Number of Radio Licenses (2015)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amateur</td>
<td>11</td>
</tr>
<tr>
<td>Radiocom</td>
<td>1183</td>
</tr>
<tr>
<td>AM</td>
<td>5</td>
</tr>
<tr>
<td>FM</td>
<td>90</td>
</tr>
<tr>
<td>TV (ATV/DTV)</td>
<td>176</td>
</tr>
<tr>
<td>TV (MMDS)</td>
<td>2</td>
</tr>
<tr>
<td>Microwave and Radiolink</td>
<td>2516</td>
</tr>
<tr>
<td>Radio Base</td>
<td>28</td>
</tr>
<tr>
<td>VSAT</td>
<td>7</td>
</tr>
<tr>
<td>Mobile Satellite</td>
<td>2</td>
</tr>
<tr>
<td>Meteorology Radar</td>
<td>1</td>
</tr>
<tr>
<td>BWA/WiMax</td>
<td>23</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,044</strong></td>
</tr>
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7. Development Plan

**Fixed Monitoring Station (1 set)**
- R&S DDF205 & ADD295
- Receiver Frequency Range from 0.3MHz to 3GHz

**Mobile Monitoring Station (2 sets)**
- R&S DDF205 & ADD295
- Receiver Frequency Range from 0.3MHz to 3GHz

**Portable Direction Finder (1 Set)**
- R&S DDF007 & ADD107/207
- Receiver Frequency range from 20MHz to 6GHz
Development Plan

**Handheld Spectrum Analyzer (1 set)**
- Anritsu MS2720T-0720
- Receiver Master Frequency Range from 3kHz to 20GHz

**Electromagnetic Fields (1 set)**
- R&S TS-EMF
- Receiver Frequency Range from 30MHz to 3GHz

**Portable Receiver On-Site Radio Monitoring (1 set)**
- R&S PR100
- Frequency range from 09kHz to 7.5GHz
**A-Central Control Center**
- Phnom Penh

**B-Regional Monitoring Center**
- Phreah Sihanouk
- Kratie
- SvayRieng
- Siem Reap

**C-Mobile Direction Finder**: (2Vehicles)

**Specification**
- VHF/UHF frequency Range: 20MHz-6GHz
- System Hardware/software
### 8. International Affairs

- **Joint Technical Committee Meeting (JTC)**

<table>
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<tr>
<th>Common Border Areas</th>
<th>Agreement/Methods for Frequency Coordination</th>
</tr>
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<tbody>
<tr>
<td><strong>Cambodia - Lao PDR</strong></td>
<td>• Joint Technical Committee (JTC): 1 Meeting/Year  &lt;br&gt;• Total 3 meetings held since 2007  &lt;br&gt;• Avoid and resolve interference on case-by-case basis  &lt;br&gt;• The frequency coordination and registration procedure was agreed.</td>
</tr>
<tr>
<td><strong>Cambodia - Thailand</strong></td>
<td>• Joint Technical Committee (JTC): 1 Meeting/Year  &lt;br&gt;• 5 meetings held since 2004  &lt;br&gt;• Avoid and resolve interference on case-by-case basis  &lt;br&gt;• The frequency coordination and registration procedure was agreed.</td>
</tr>
<tr>
<td><strong>Cambodia – Vietnam</strong></td>
<td>• Joint Technical Committee (JTC): 1 Meeting/Year  &lt;br&gt;• 6 meetings held since 1999 – 2015  &lt;br&gt;(Preparing its 7th meeting during July 2016 at Ho Chi Minh, Vietnam)  &lt;br&gt;• Avoid and resolve interference on case-by-case basis  &lt;br&gt;• The frequency coordination and registration procedure was agreed</td>
</tr>
</tbody>
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9. Challenges

- Technical Staffs in Telecom. and ICT experiences.
- Standardization Regulations and Technical
- Laboratory Test
- Radio Monitoring Equipment
The Key Action Plan

Prepare regulations on:
- Re-farming guide line and procedure of 2G
- Frequency planning and use
- Spectrum allocation & assignment
- Management/Coordination to avoid interference
- Revise on Spectrum usage and license fees
- Short Range devices (SRD)
- Type approval guideline
- Harmonized spectrum (License, 700MHz/Unlicensed, 2.4GHz & 5.8GHz WLAN; RLAN)
- Joint cooperation for terrestrial digital TV Switch Over (TVSO)
THANK YOU