Technology Inequality: Opportunities and Challenges for Mobile Financial Services

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CFI Fellows Program

- Established in July 2015 with the goal of encouraging independent research and analysis that answers some of the most important challenges in financial inclusion.
- Our first cohort was located in three different countries, conducting research on about 20 different markets.

Presentation roadmap

Overview

- Introductions
- Report focus and purpose
- Research methodology

Study

- The MFS ecosystem
- Channels, devices, and challenges
- A role for regulators

Discussion

- A response
- Q&A

Report purpose

1. To determine whether the core technical components of the MFS ecosystem interact well with one another

2. To identify pain points for MFS, and legal and regulatory issues

3. To motivate providers, vendors, regulators and other key stakeholders to improve upon existing devices, system security, and the regulatory environment for effective access to MFS

Report focus

Access platforms

- Mobile data bearer technologies
- User interfaces (UIs)
- Network access coverage
- Related competition issues

User devices

- Types of devices in use, evolution
- Reliability, quality, cost of devices
- Fraud, counterfeits

Security challenges

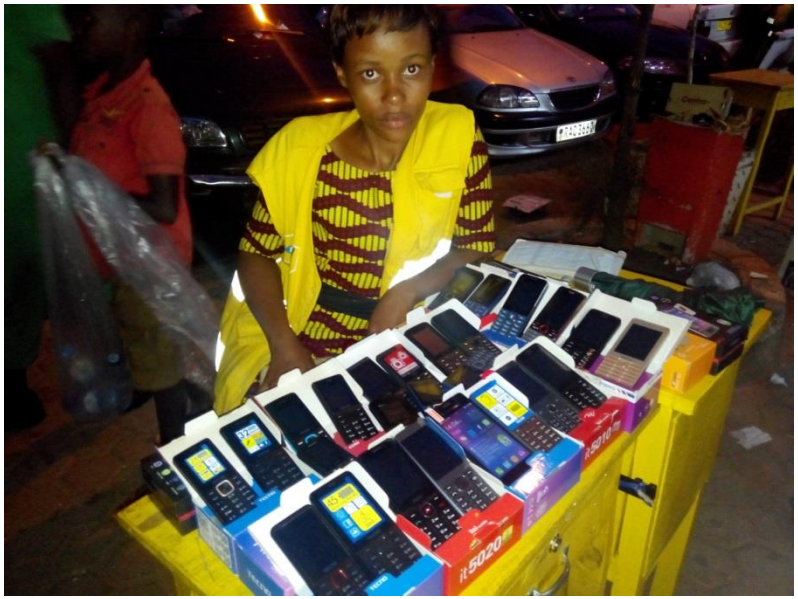
- Vulnerabilities at network level
- Man-in-the-middle attacks

Research methodology

- Countries visited: Bangladesh, Colombia, El Salvador, Fiji, Jordan, India, Malawi, Mozambique, Rwanda, South Africa, Tanzania, Uganda

- Testing mobile financial services infrastructure, handsets, network coverage and quality, security vulnerabilities

- Interviews with key stakeholders – MNOs, technical service providers, payment service providers, etc.



Leon Perlman

CFI Fellow, Head DFSO and Independent Consultant

Leon Perlman is a doctoral-level expert in digital financial services, payments systems, financial inclusion, mobile technology, and compliance, with over 16 years of experience in the sector. He has experience advising central banks, finance ministries, the ITU, the Gates Foundation, GSMA, the World Bank Group, and the World Economic Forum.

A former scientist and successful entrepreneur, Leon has worked in the telecommunications and micro-payments industry since the mid-1990s and has a wide range of experience in both developed and developing markets.

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The MFS ecosystem: the prevailing narrative – *MFS is poised for a smartphone revolution*

The Mobile Economy 2017, GSMA (March 2017)

By 2020,
mobile internet penetration will reach 60%
(up from 48% at the end of 2016)

As of December 2016, there were
277 live mobile money services in 92 countries

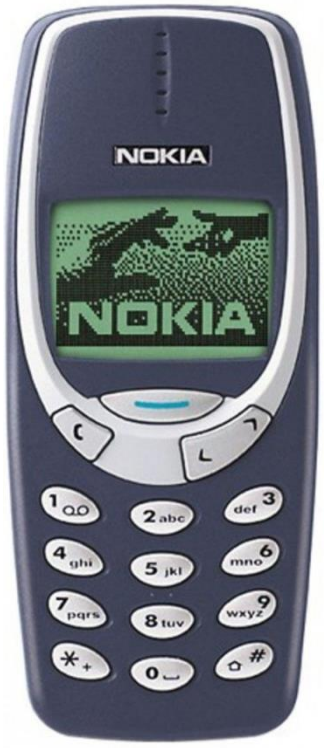
By 2020, there will be
5.7 billion smartphones
(a growth of 1.9 billion from the end of 2016)

Separating fact from fiction

Smartphones will be a majority of global mobile connections by 2020	Basic and feature phones constitute vast majority of phones used in the developing world
Smartphones are the next imminent step in MFS access	Smartphone technical specifications and high-speed (3G) networks must first be enhanced & improved
Current Universal Service Obligations are sufficient to ensure that MNOs will fulfill BoP user needs	We do not see ***universal quality of service*** in the field

The evolution of MFS devices

Basic Phone → Feature Phone → Smartphone



Evaluating Device Types

	Basic phones	Feature phones	Smartphones*
Advantages	• Low price (below US$6) • Up to 1 week of battery life in standby mode	• Slightly larger screen size (between 1.4-4”) • Long battery life	• Improved UI/UX • Larger touch-screen displays
Shortcomings	• Basic phones are often not reliable enough to foster more inclusive MFS growth • No data connectivity	• Minimal memory storage • Slower memory • Incompatibility between chipsets • Very limited support for 3G-4G mobile data	• Insufficient storage space • Poor battery life • Low-quality components • App compatibility issues

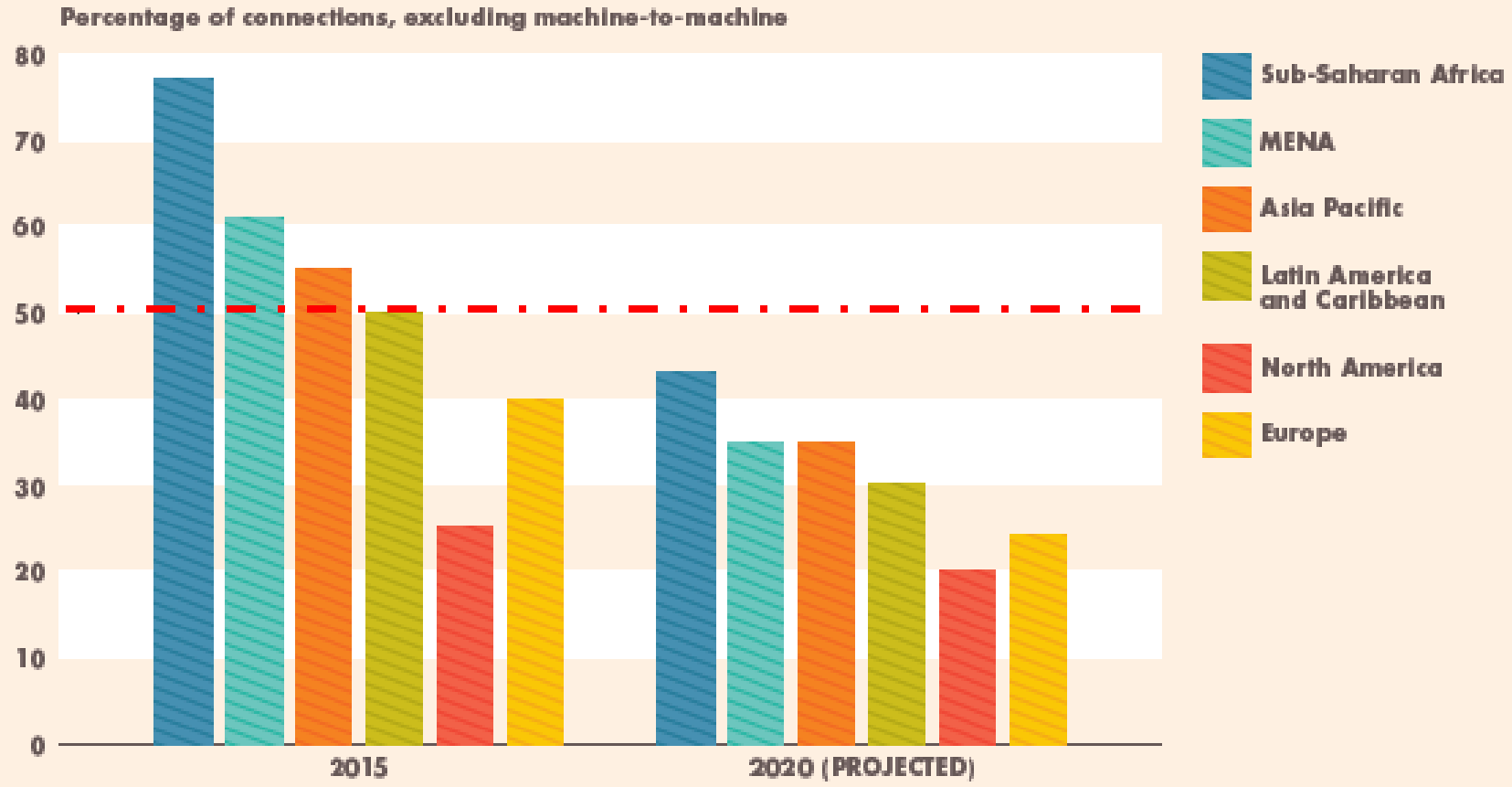
*For low-end smartphones (below US$30)

MFS User Interfaces

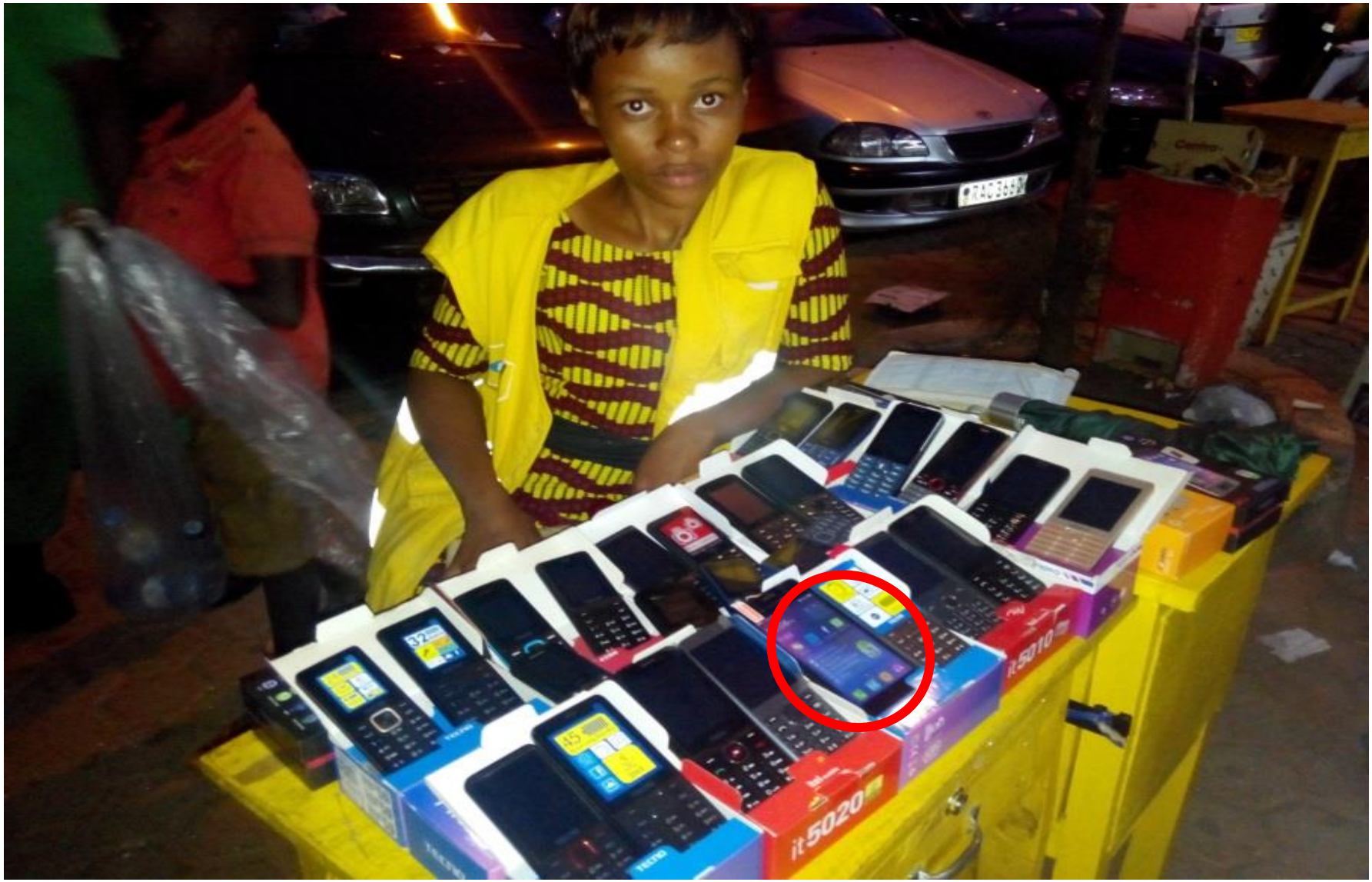
	Basic and Feature Phones			Smartphones
	USSD	**STK**	**Java-based**	**Downloadable Apps**
Characteristics	• Simple, easily-updated menus • First developed in the 1980s	• End-to-end encryption (safer than USSD) • First introduced in the 1990s	• User-friendly icon-based menus • Lower transaction costs for service providers & consumers	• Rich user interfaces (UIs) and user experience (UX)
Shortcomings	• Lack of (transaction) security (SS7) • Frequent session timeouts in 2G environments • Increased transaction drop-off	• Relatively expensive • Gateway and pricing issues	• Fewer apps are available • Cannot be used on basic and many feature phones	• Expensive to download and upgrade apps • Heavy memory requirements • Requires high-speed (3G+) connectivity

EXHIBIT 6

Basic and Feature Phone Use



Source GSMA, 2016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Challenges for MFS

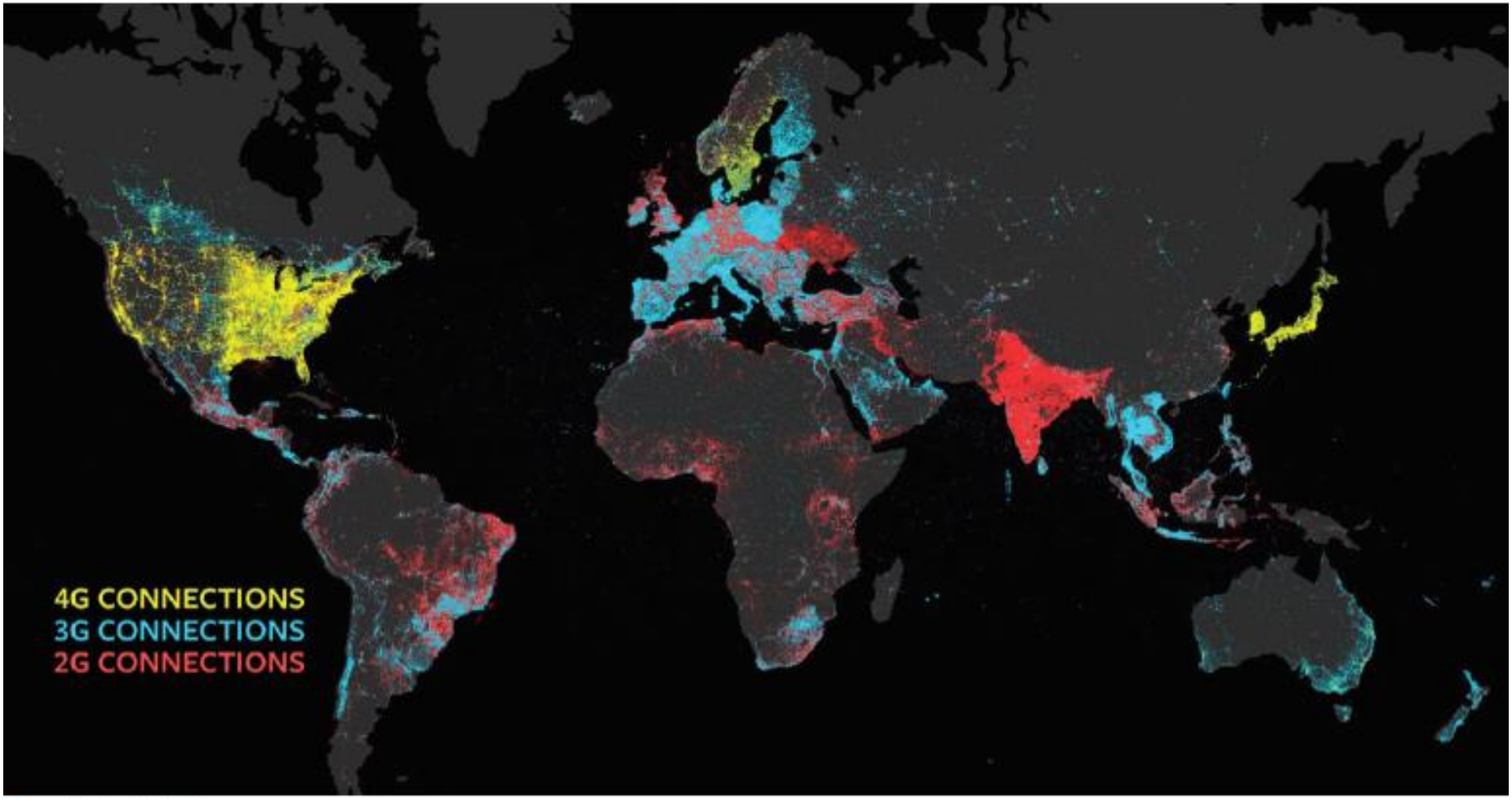
MFS infrastructure:

- Low-speed (narrowband) mobile network coverage (2G-type)
  - Sometimes only option available in rural and less densely populated areas

- High-speed mobile network coverage (3G and up)
  - High infrastructure and spectrum costs contribute to MFS access gap in the developing world

EXHIBIT 5

Global Connectivity Speed[43]



Source Facebook, 2016

Challenges for MFS

Network security

- SS7 vulnerabilities
  - Remote interception
  - OTP; Push USSD; Spoofing
- Vulnerabilities in base station security
  - Man-in-the-middle attacks via Stingray

EXHIBIT 24

Intrusion Vulnerabilities and Exploits in MFS and Mobile Networks[130]

The percentages indicate the most prevalent types of exploits of SS7 and USSD that have been reported globally via the ITU.

Source Dmitry Kurbatov, 2016

Challenges for MFS

Counterfeit, fraudulent, and stolen devices

- Fraudulent IMEIs
- Graylisting & blacklisting
- Poor device quality
- Health hazards
- Connectivity issues → impact on quality of service

EXHIBIT 21

Unique International Mobile Equipment Identity (IMEI) Verification

At the top, a genuine IMEI number found on a sticker inside a feature phone. Inputting the discovery code ***#06#** will show that the original IMEI number has been replaced with a set of zeros (on the bottom). These changes hide the phone's true identity.[115]

Photo credit Leon Perlman

The case for quality

- Infrastructure
- Access technologies
- Handset specifications

A role for regulators

- Mandating higher speed coverage in underserved areas → universal quality of service
- Combating the manufacture and sale of counterfeit, fraudulent and stolen devices
- SS7 vulnerabilities necessitate a coordinated response
- Mediating conflicts of interest; competition

Some promising developments

- Costs are coming down due to
  - System-on-a-chip (SOC) technology
  - Expiration of patents of legacy brands
  - Emergence of new competitor brands
- The switch from analog to digital TV may free up much-needed frequency spectra
- Iris scanners for biometric verification and authentication (e-KYC, etc.)

EXHIBIT 25

Taisys-Manufactured Thin SIM

A thin SIM is placed over the SIM from another MNO. Taisys manufactures thin SIMs for Equitel and all of Equitel's MFS-related STK activity runs over MNO Airtel.[152]

Photo credit Taisys

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Discussion

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