

Technology and BFSI Sector an emerging market view

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Phases of Learning

- How does one learn / understand a concept?
 - When a teacher (or some experienced person / elder) tells you and you BELIEVE
 - Mathematical / Theoretical learning: understood in terms of jargon/ buzz words
 - Highest form of learning: when you can go back and explain the concept to your grandmother

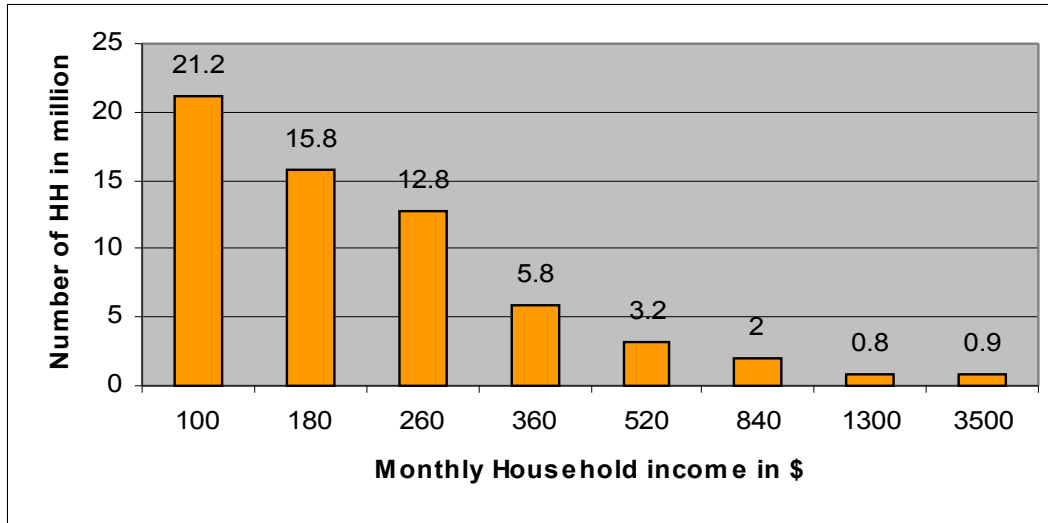
Outline

- Introduction
 - Emerging Market
 - Technology
- BFSI going forward
 - Front end
 - Network
 - Back-end
 - Security and Authentication

Emerging Market

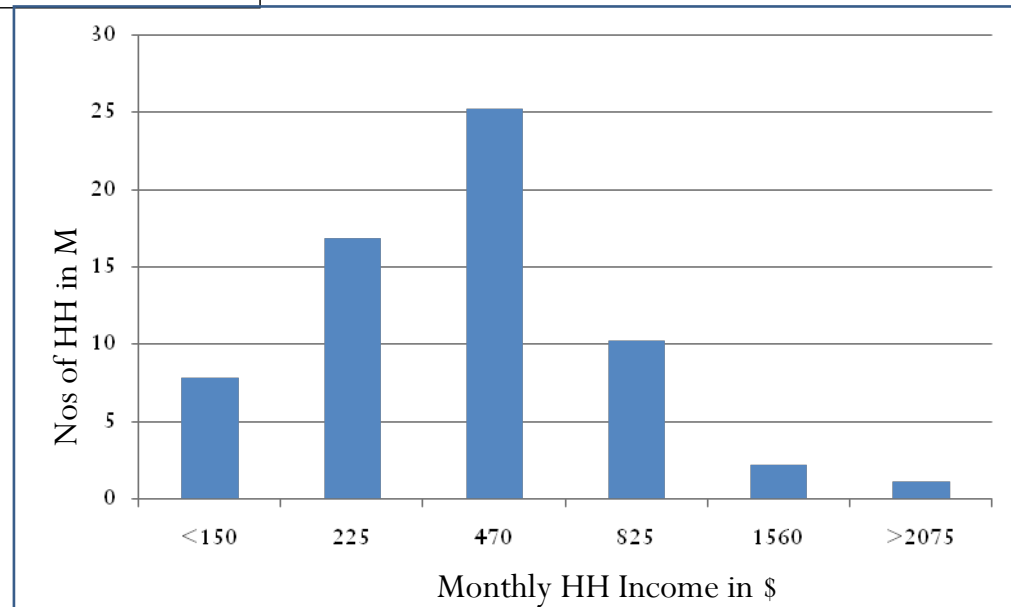
- India – China
 - Very Large population
 - Very Large Market
 - but at right price point as affordability is low
 - Telecom systems ten years back broke even at \$25 Average revenue per month (ARPU): about ten million phones in India
 - Today's telecom system designed to break even at \$ 5 ARPU: India adds 100 million phones per year
 - Tapping the large market enhances incomes very rapidly
 - Enhancing the affordability further

Changing Indian Affordability: 65M urban homes

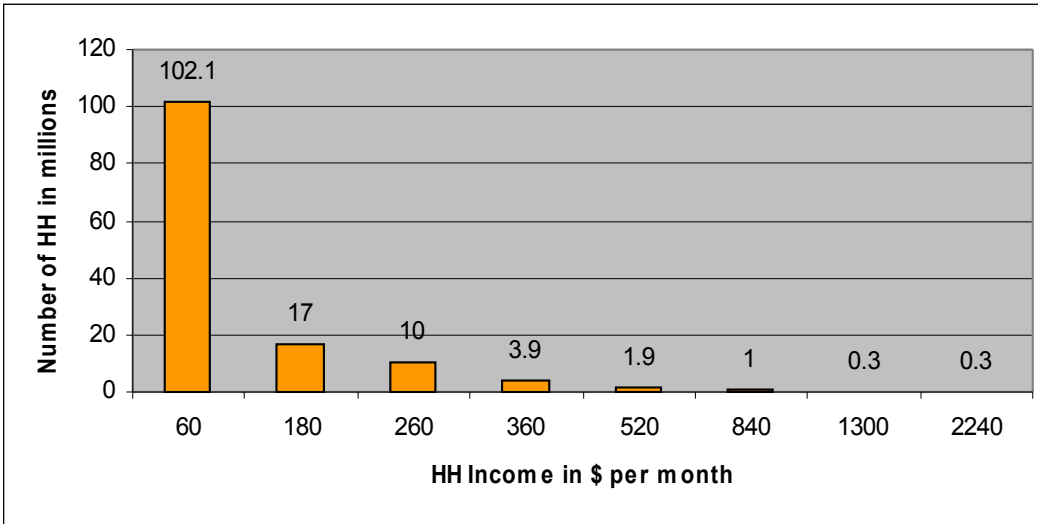


2001

2007

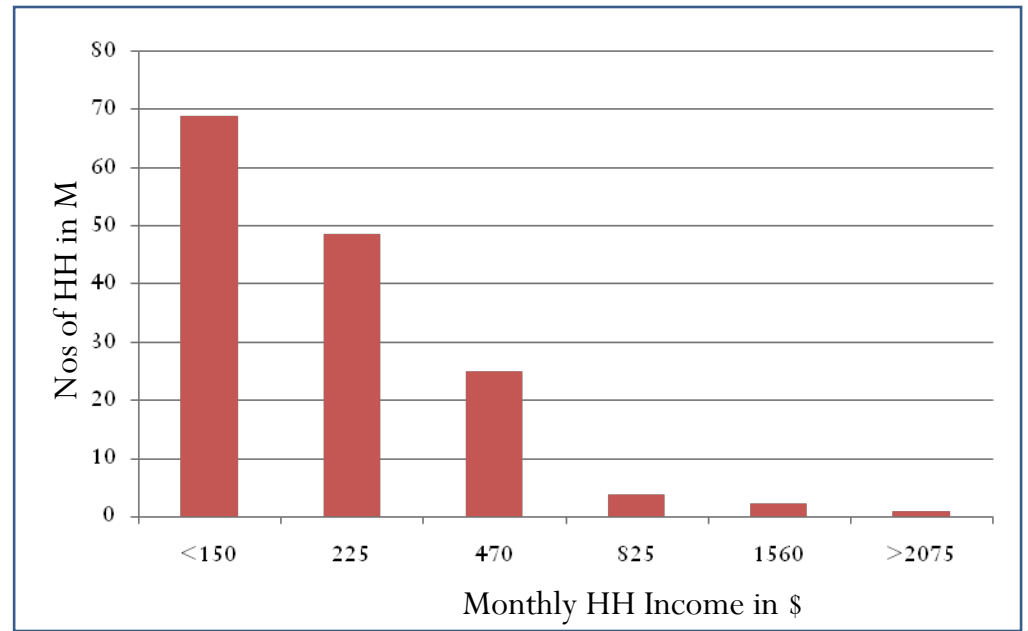


Changing Indian Affordability: 150M rural homes



2001

2007



Serving Emerging Markets

*As one develops
the technologies
the business models
and the processes
to serve this very large but low affordability market profitably
one becomes the global leader*

A technology exercise

- Porting of MP3 music decoder on a DSP processor commonly used in handset
 - C code available on standards website: 900 plus MIPS
 - Optimising C Compiler: 600 plus MIPS
 - Profiling and figuring out which data is used more often and placing the data in suitable internal memory and Cache: 40 MIPS
 - Profiling and hand-coding three functions in assembly (less than 50 line code): 16 MIPS
- Similar numbers with MPEG2 decoder on the processor
 - From blind porting : 10000 MIPS
 - to optimised programming and porting: 700 MIPS
- A software can be executed 20 to 60 times faster with right design and porting

Observations

- Computer Systems and Software solutions are complex
 - CPU MIPS, architecture, cache, internal memory, external memory, disk latency and virtual memory, assembly and high level language
 - Large number of variants determine performance and response time
 - High functionality program creation is a huge effort: has to be simple to create and maintain
 - requires large number of programmers – need not understand architecture
 - Well optimised (in terms of performance) program requires a far greater effort, more difficult to create and maintain
 - Would require very experienced and trained persons
 - Moore's law compensates for non-optimised programming
 - Hardware becomes faster and cheaper, while programming practice focus on functionality rather than optimisation

BFSI

- Technology drives BFSI today
 - Front-end technology
 - Network
 - Back-end systems and software
 - Security and authentication

Front-end

- Enabling end-customers to access banking, financial and insurance services
 - Very rapidly changing
 - Enabling very high growth of customers, especially in emerging markets
 - In India, front-end part of a transaction involving a bank-teller costs the bank a bit under USD 2 per transaction
 - An ATM transaction costs \$ 0.25
 - An Internet transaction costs the bank nil
 - and a mobile transaction costs the bank nil
- Electronic transaction reduces the costs drastically and enables
 - Expansion of customer base
 - Capturing more and more transaction (smallest purchases) by the bank

Front-end

- Watch out for:
 - Mobile based transaction
 - Natural voice based transaction using speaker recognition in multiple languages and IVR
 - Especially as large sections of people in emerging markets are far more comfortable with voice
- We should take leadership in embedding these technologies in each of our products



Network

- Becoming omnipresent, high-capacity, secure, redundant and reliable
 - Last mile on broadband wireless in coming years would close the gap
- Fibre can carry astronomical bandwidth over long distances
 - With Wavelength Division multiplexing, it carries about a terabit per second
 - A million full screen MPEG4 video carrying capacity
- Copper with DSL can carry 10 Mbps for short distances

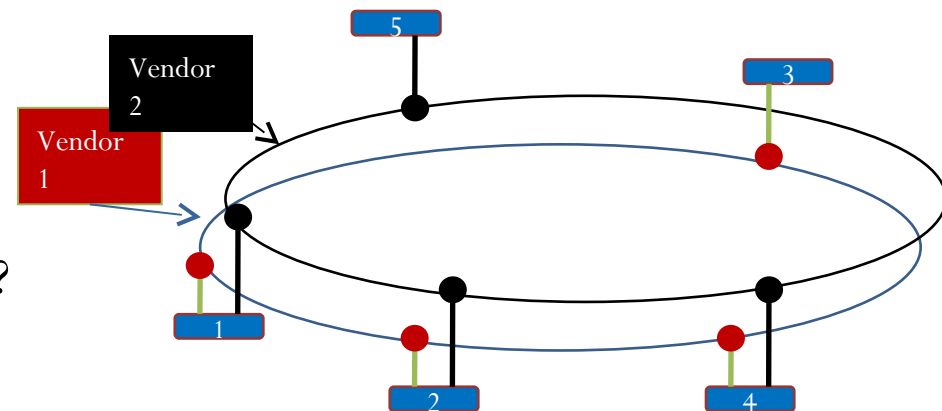
Wireless: Beware of hype

- Throughput depends on distances, number of users, peak to average requirement, spectrum available, reuse of spectrum
 - Today's terrestrial wireless (3G+, WiMax): 100 kbps average per user in dense environment with medium spectrum
 - Likely to triple in two to three years
 - Satellite wireless
 - Spectrum reused across 1000s of Kms: a single beam will illuminate whole of India or China
 - A transponder gives net of 24 Mbps (both ways) and costs about \$ 1 million a year (sharing cuts throughput by 70%)
 - If shared by 10,000 terminals => 1.6 kbps average both way
 - Peak rate could be 512 kbps and higher throughput when not shared
 - Satellite is great for broadcast and for unreachable area

Tomorrow's Network

- MPLS or Metro-Ethernet VPN network using fibre, copper and wireless
 - Satellite in real remote areas
 - Customer configurable data-rates
- Network Management to manage traffic, security, network elements, servers, end-devices including customer desktops and mobiles

- Can we design these networks?
- Can we deploy these networks?
- Can we manage these networks?



Back-end

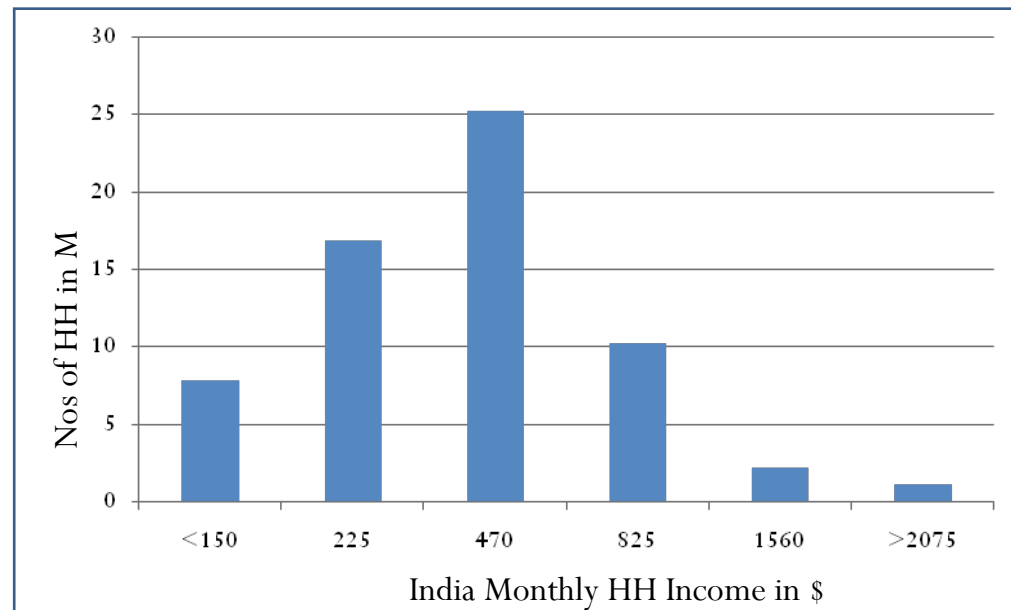
- The critical part, especially in the BFSI segment
- Servers, operating systems, database, middle-ware, application software
 - Need to scale as number of end-customer and number of transaction increases
- Back-end bank transaction costs 3 to 5 cents per transaction in India
 - Banks not concerned as long as front-end dominated by teller or ATMs
 - But as Internet or Mobile transaction increases, back-end would dominate (well designed network cost would contribute minimal)

Story of telecom back-end costs

- In 1994 in India it used to cost Rs 1 (2.5 cents) per transaction
 - Telcos used to charge extra for detailed long-distance billing
 - Bharati Telecom outsourced to IBM their complete IT back-end on revenue share principle
 - Average call / SMS gives Rs 0.25 to telco => IBM gets about 5%
 - Initially IBM struggled -- but today its cost per transaction is about 0.7p (Rs 0.007)
- Why has this not happened in banking?
 - Banking back-end has not yet come into pressures
 - Banking software built-upon legacy software of 60's and 70's
 - Has barely used technological advancements
- With Mobile transaction, every purchase of a customer may come on bank's back-end
 - volumes can go up 100 fold with only float/spread as income
 - Banks/ insurance companies have to do what telcos did

Emerging market dynamics

- Redesign back-end products with scale of these markets in mind
- Network throughputs for end-customer is not uniform
 - Do we design products to be network aware?
- End-user desktops may vary: not necessarily top of line
 - Do we design products keeping for desktop variations?
- Deliver the functionality in varying conditions to enable large variety of customers
- **Capture leadership**



Security and authentication

- Security techniques mature: encryption, key distribution, levels of security and threats
 - Important that **everyone in BFSI sector understands basics**
 - Remember that PC is a insecure device (replaced software on a PC can pretend to be original)
 - Network Management to continuously scan the desktop software
- Authentication: password / PINs are poor authentication devices
 - Biometric authentication getting mature
- Automatic detection of security violation by cameras
 - Was impossible few years ago; Moore's law has enabled complex algorithm to be executed in real time
 - Example: a camera with embedded algorithm spanning a room and checking out if some one brings in a brief-case in the room and leaves without it

Finally

- My perception
 - 3i has excelled in distributed systems and distributed management
 - Has some great products
 - Will continue to be the growth engine in years to come
- In coming years
 - Should strive to become the technology leader in a few areas
 - Would give a distinctive competitive advantage