

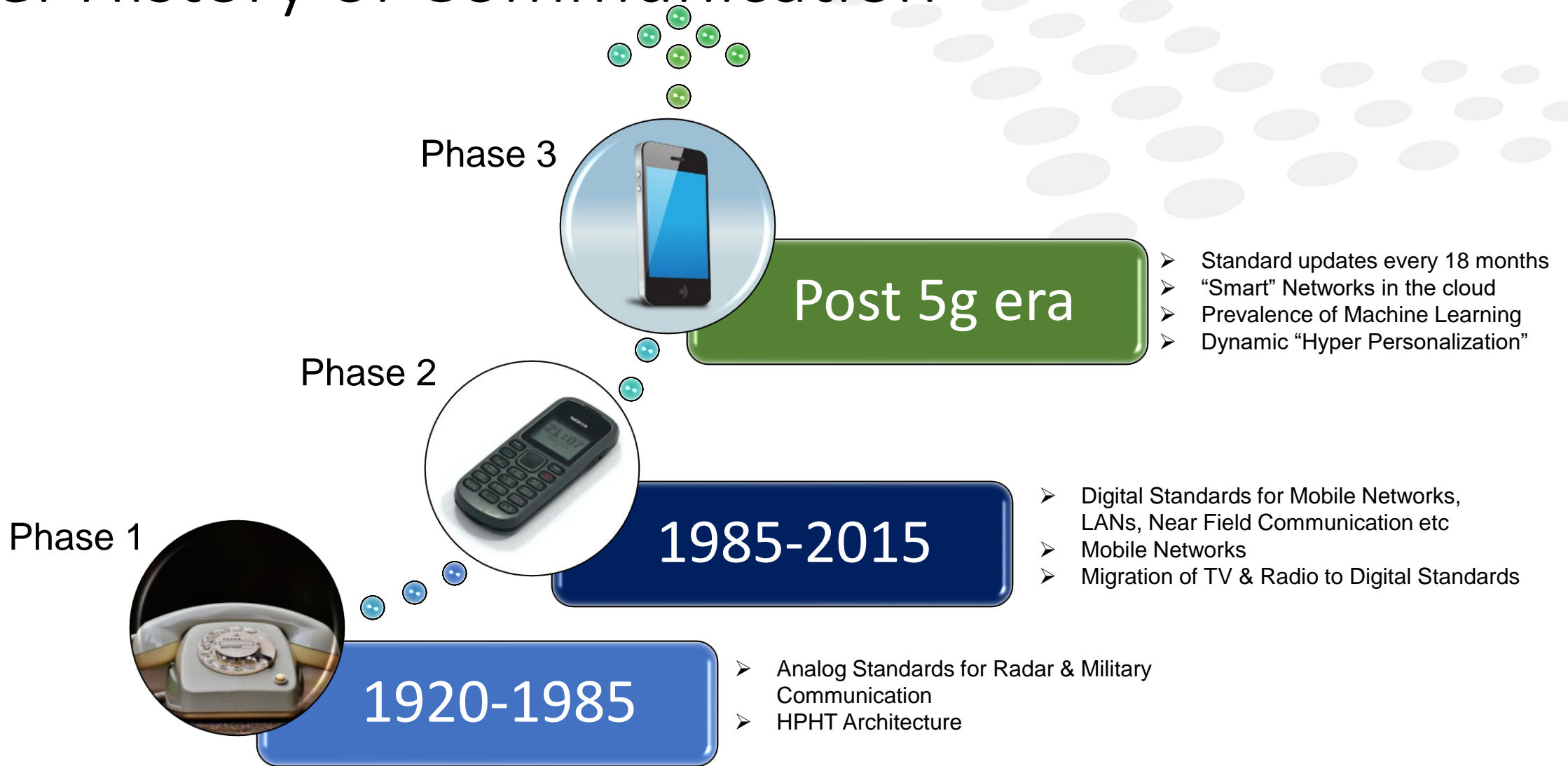


# Saankhya Labs

Beyond 5g and India's role

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# Brief History of Communication





# Wireless RAN designs so far

- Focus mostly on the spectral efficiency axis
    - Better FEC schemes
    - Exploit spatial, frequency and layer diversity ( NOMA )
    - Improvements by bandwidth aggregation mostly
  - Static architectures and provisioning
    - Both regulatory and implementation architectures
  - Closed ( quasi-open ) and exclusive
    - No or little sharing
  - Interference free
    - Limited interference FFR/Reuse 1
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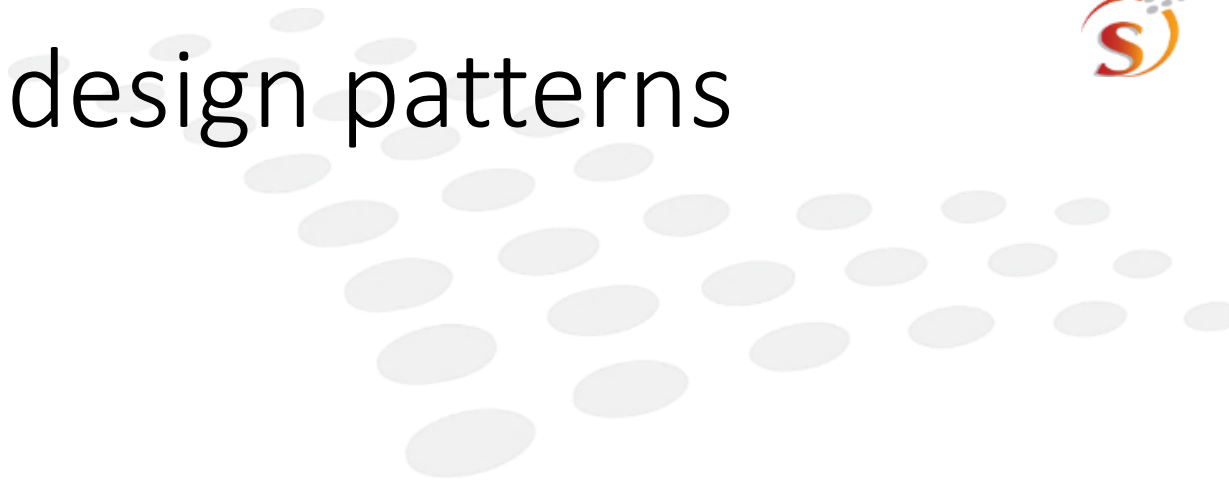
# Future RAN and network design patterns

- From static to dynamic regimes
    - Technology and regulatory
  - Closed/Quasi-open to fully open
    - From oligopoly to democracy
  - Silos ( of cellular, broadcast, satellite ) to Convergent networks to “Liquid Networks”
-



# Future RAN and network design patterns

- From static to dynamic regimes
  - Technology and regulatory
  - Sharing is good
- Closed/Quasi-open to fully open
  - From oligopoly to democracy
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# Pattern 1 : Static to Dynamic Regimes

- Radio environment is dynamic
    - OODA loop to adapt the network => AI/ML bots to design RAN
    - Optimally use network resources
    - Environment and “pay load” aware RAN
  - Dynamic spectrum allocation policies
    - Sharing is in “3g” : 1g- Wifi, 2g-TVWS static databases – 3g CBRS with rudimentary spectrum monitoring
    - 6g in DSA would be a true cognitive RAN much like traffic aware “signals”
    - Newer financial models ( other than auctioning ) should and will evolve
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# Pattern 2: “Analog” Closed to “Digitized” Open architectures

- 3gpp is Quasi-open
    - Centralized and controlled by a few large cos; Move from oligopoly to democratic decentralized
    - GNU and Linux like licensing and collaboration regimes ; “Open” isn’t free
  - Open implementations
    - x-RAN style is a baby step creating a new dynamic ecosystem
    - 5g is open infra, 6g should be open device ecosystem
  - “Digitize” Radio environment => “Radio mapping”
  - Virtualize “interface” not “implementation”
    - Think of app development scenario circa 1995 pre- Java years
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# Pattern 3 : Towards Liquid Networks

- Cellular broadcast, satellite networks operate in silos
    - Partly due to legacy, regulatory and business interests
    - Time to break them down
  - Horses for courses
    - Broadcast networks are optimized for video delivery
    - LEO satellites are launched like “kites”
  - A common central “core” helps connect disparate physical networks : Slices in 5g ?
    - Broadcast slice as a service ?
    - “Swiss army knife” tool kit
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# What should we be doing ?

- Policies and market support for
    - Dynamic access solutions
    - India telecom stack ?
    - Water the green shoots and treat it like a bamboo tree not a immediate fruit bearing plant !
  - Monetary support and a long term investment plan
  - Precedent exists
    - India stack
  - Participation in standardization
  - Set an actionable goal to achieve 5-10% share of the global telecom IP supply chain
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# Thank you



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