



# Core Information and Communications Technology Industry

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# ICT Stack

Applications

**Economic**  
Retail, Agri.,  
Manf., BFSI, ..

**Societal**  
Health, Education,  
Governance..

**Security**  
Defense, Cyber,  
Intelligence,..

Services



Cloud



Wireless



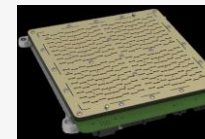
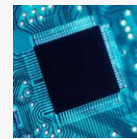
Internet



AI

Core ICT

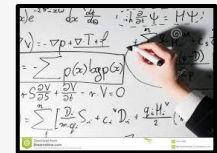
Cloud



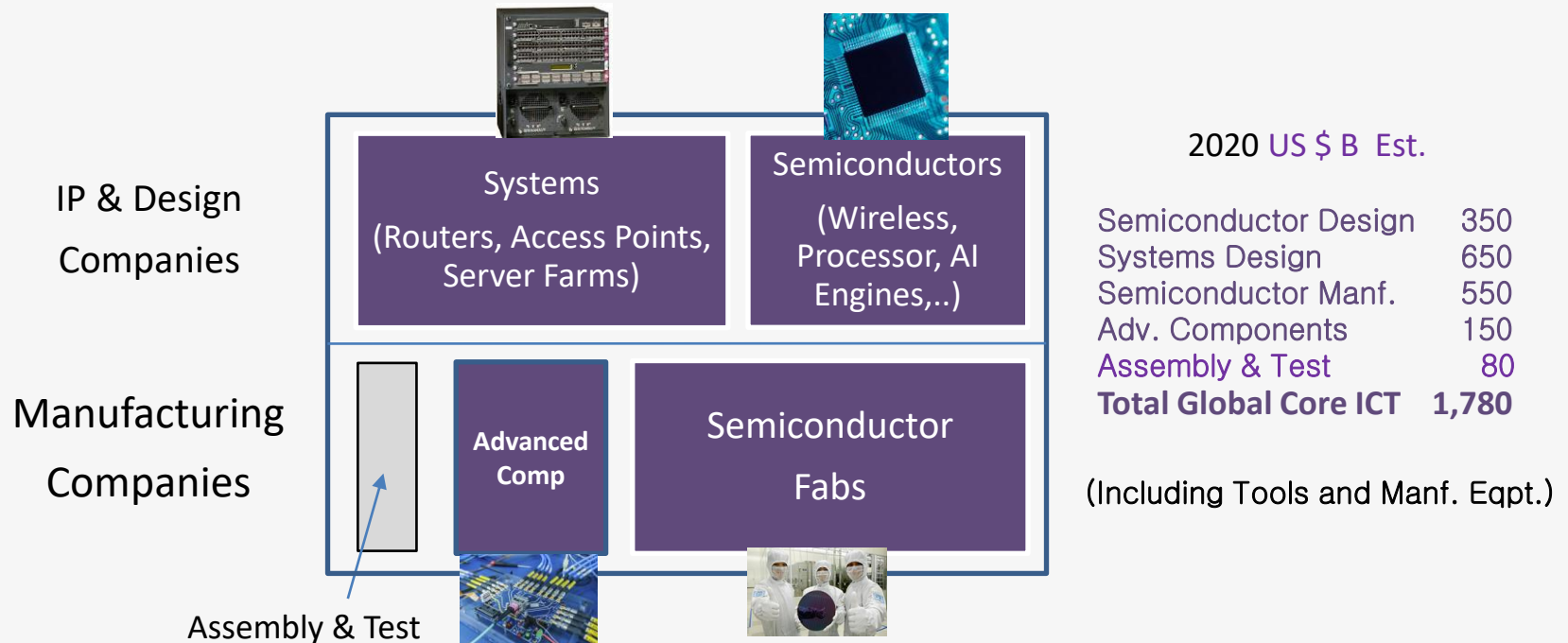
Technology for data centers, wireless base stations, routers, phones, laptops ...

# Core ICT

**Algorithms**  
**Chips - Compute, Comm. , AI Engines,..**  
**Boxes – Routers, Phones, Base Stations,..**



# Core ICT Industry - Structure



## Smart Phone ASP 600\$ - Brand XYZ

### Price Break Down 600 \$

<u>Design</u>	
Sales, Mktg, Profit	125
R&D & IP	85
<b>Total</b>	<b>210</b>

<u>Manufacturing</u> (Outsourced)	
Semiconductors	250
Display	45
Other Comp	65
Labor	30
<b>Total</b>	<b>390</b>

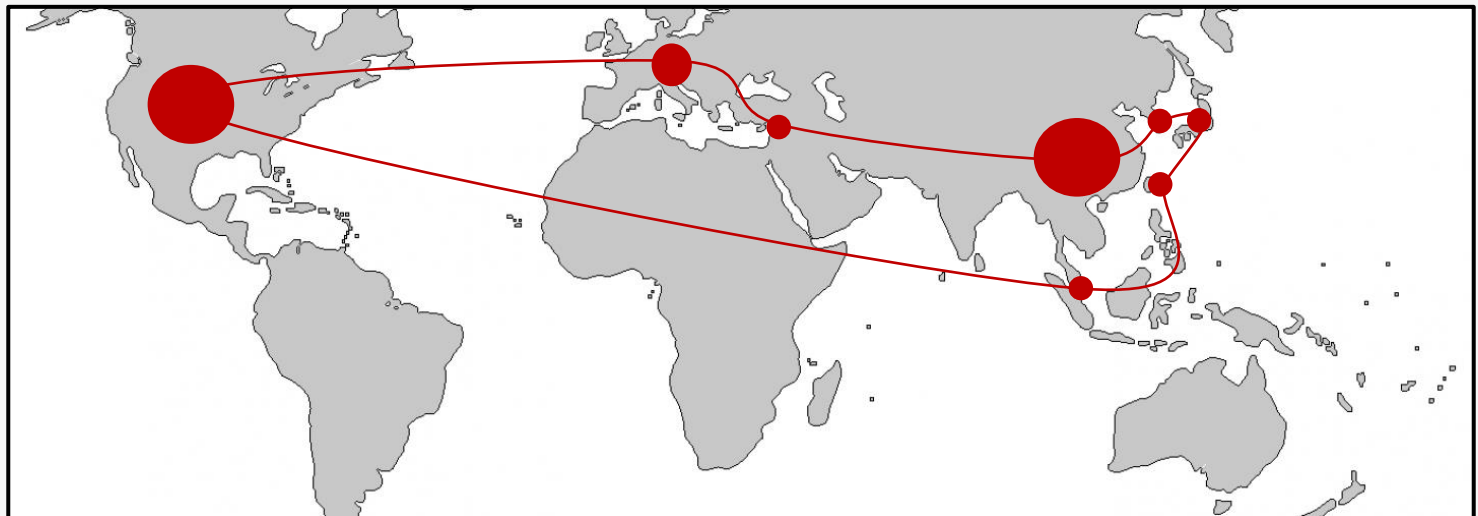
### Supply Chain Companies

<u>Design</u>	
Supporting IP and Tools	10
Acquired IP	20

<u>Manufacturing</u>	
Primary Component	10
Supporting Component	10
Tools	20
<b>All Total</b>	<b>70</b>

## Core ICT Industry Global Eco-System

1,700 B \$ (Excluding Assembly and Test)



Major participating companies operate internationally but are Headquartered in  
- China, US, Japan, Europe, S Korea, Taiwan, Israel and S'pore.

## 5G Patent Families

Huawei Technologies – 3,147  
Samsung Electronics – 2,795  
ZTE – 2,561  
LG Electronics – 2,300  
Nokia (including Alcatel–Lucent) – 2,149  
Ericsson – 1,494  
Qualcomm – 1,293  
Intel – 870  
Sharp – 747  
NTT Docomo – 721  
Guangdong Oppo M – 647  
China Academy Of Telecom – 570  
Interdigital Technology – 486  
Vivo Mobile – 238  
BlackBerry – 139

NEC – 122  
ASUSTeK Computer – 111  
Lenovo Group – 97  
HTC – 93  
KT – 85  
Apple – 77  
ETRI – 61  
Fujitsu – 58  
Motorola Mobility – 55  
MediaTek – 38  
WILUS Group – 33  
Panasonic – 32  
FG Innovation – 30  
Sony – 17  
ITRI – 14  
SK Telecom – 11  
Spreadtrum Communications – 10

~ 18,000 72% China (35% Triadic)

# Core ICT Decline after 1980s

ITI



1948

Electronics  
Commission



1968

1978

1988

1998

2008

2018



TIFRAC

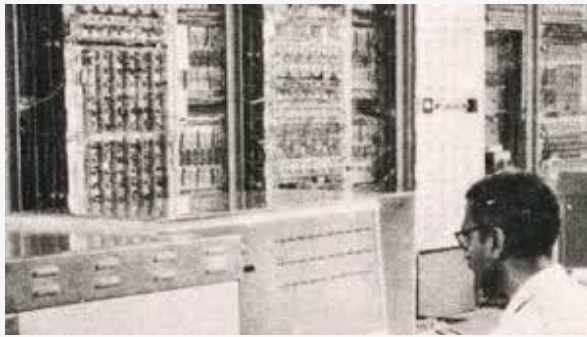


CDOT

India's Share  
of Core ICT  
Global Revenue  
Declines



## Notable World Class Achievements



TIFRAC 1960s

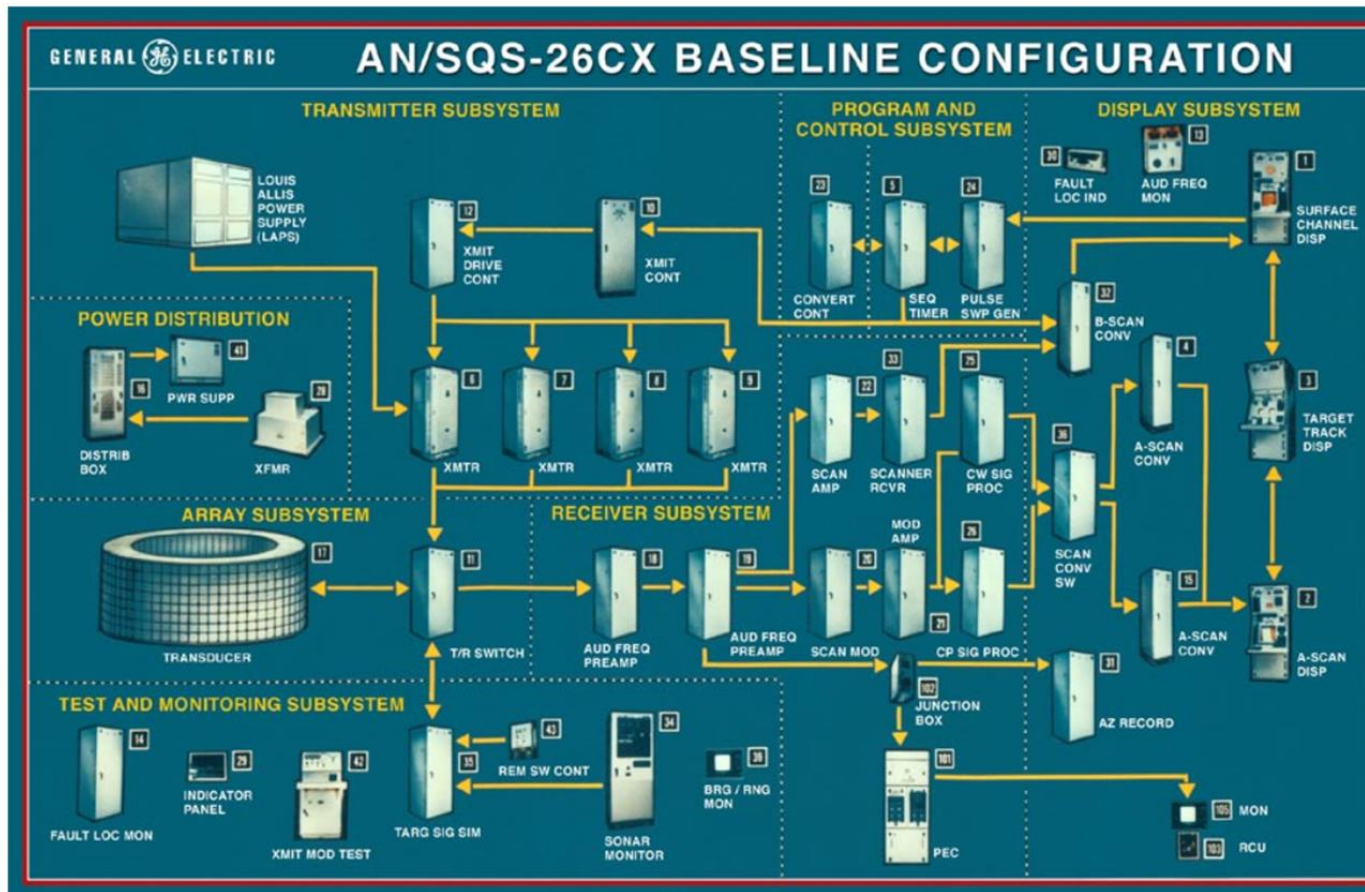


APSOH 1970s



DSS Max 1980s

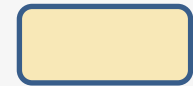
# SQS 26 Gen 2 Sonar (APSOH was Gen 3)



Provided by Harry Tucker and Lawrence Wafal, both formerly of GE

Figure 12. Components of the SQS-26 (CX) in the Early 1970's

# India HQ ICT Stack



MNCs

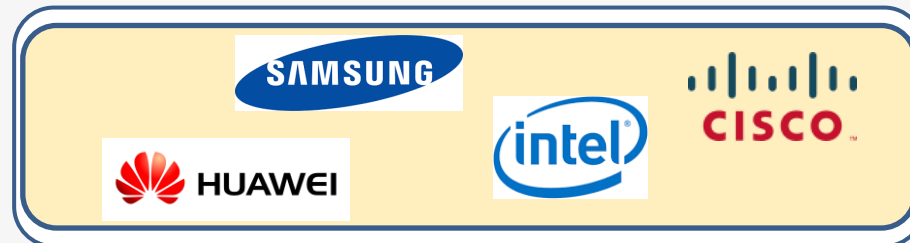
Applications



Services



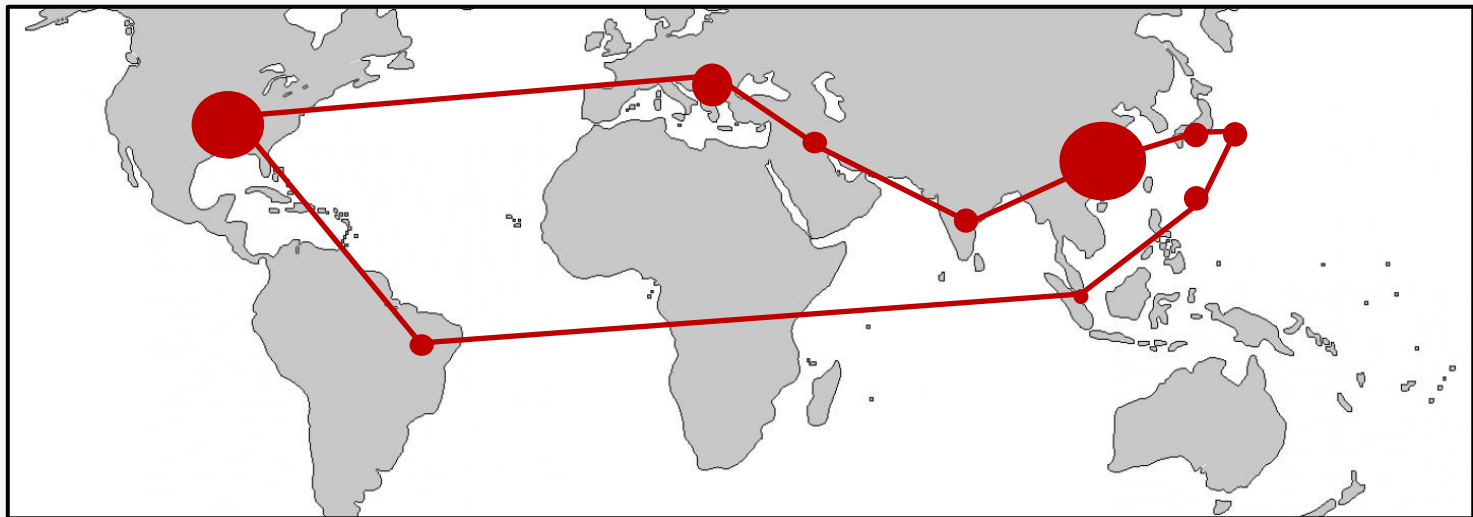
Core ICT



Engg Services

# Core ICT Industry Global Eco-System 2030

4.5 T \$ (Excluding Assembly and Test)



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