



# 5g, talk with Prof

Prof Abhay Karandikar, Director of Indian Institute of Technology, Kanpur, on "Frugal 5G - Towards Inclusive Affordable Broadband for a new Digital Bharat"

<https://www.youtube.com/watch?v=jMGv1JgrG-k>

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2g - voice

3g voice +data

4g = data

**5g =**

- 1) enhanced mobile broadband, for faster downloads
- 2) ultra reliable, **low latency (means low delay )**
- 3) massive connectivity , IOT

High data rates, high reliability

**Comes with**

- increase in deployment cost,
- increased energy consumption
- increasing complexity of the network

low latency, reliable

example robotic surgery, vehicle to vehicle communication, AR/VR

Rural broadband

challenges

- 1) very low avg revenue per user (eg. 100 per month only)
- 2) scarcity of power from the grid, so telecom operator has to rely on generators etc, hence operation cost, infact today big cost is of fuel at the moment to the operator
- 3) lay the fiber till those remote villages , is expensive
- 4) large content is in english, **needs to be in Local Language**

**our requirements are very different (FRUGAL 5g ) IEEE p2061 project**

Hence 5g requirements need to be rethanked

- a) limited mobility support
- b) fixed primary axis
- c) low cost solution (device cost to be low , yet powerful )
- d) efficient use of spectrum
- e) energy consumption need to be reduced
- f) large coverage area support (large cell at rural areas)
- g) less stringent availability requirement

700Mhz spectrum

solution

PPPE Partnership (with villages)

**Radiation Effect:**

- it works in similar spectrum back,
- non ionising radiations, heating effects , only,, just like sun light
- no harmful effects of radiation , because of 5g

smaller towers, can be deployed on sites of building

26 ghz frequency it will work

but if we go to 700Mhz ,,then tower size will be big

India needs to be self reliant, IP patient our standards  
develop indigenously

yes, new 5g phone will be required

4g phones cannot be upgraded to 5g phones

**core network is quite different ,**

- **softwarization of network**
  - maybe in future 5g to 6g..software upgrade will be suffecient
  - need significant investment from the operator

are are importing telecom equipment's,

2nd biggest telecom market

5g is going to be the backbone of the communications in years to come