VIEW OF B4G AND 5G –

FROM CAPACITY TO APPLICATION

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invention | collaboration | contribution

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Evolution of Wireless Technologies – *Towards 5G*

2G
Narrowband

3G
Broadband for few

4G
For the masses

5G & Beyond
Ultra High Capacity and High Performing Applications

Future direction indicators:

- Ubiquitous Resource Access
- Adv. Radio Network (Multi-RAT, -Layer, …)
- Network Sharing (Cloud $ Virtual Network)
- Dynamic Spectrum Sharing
- Multifunctional user devices

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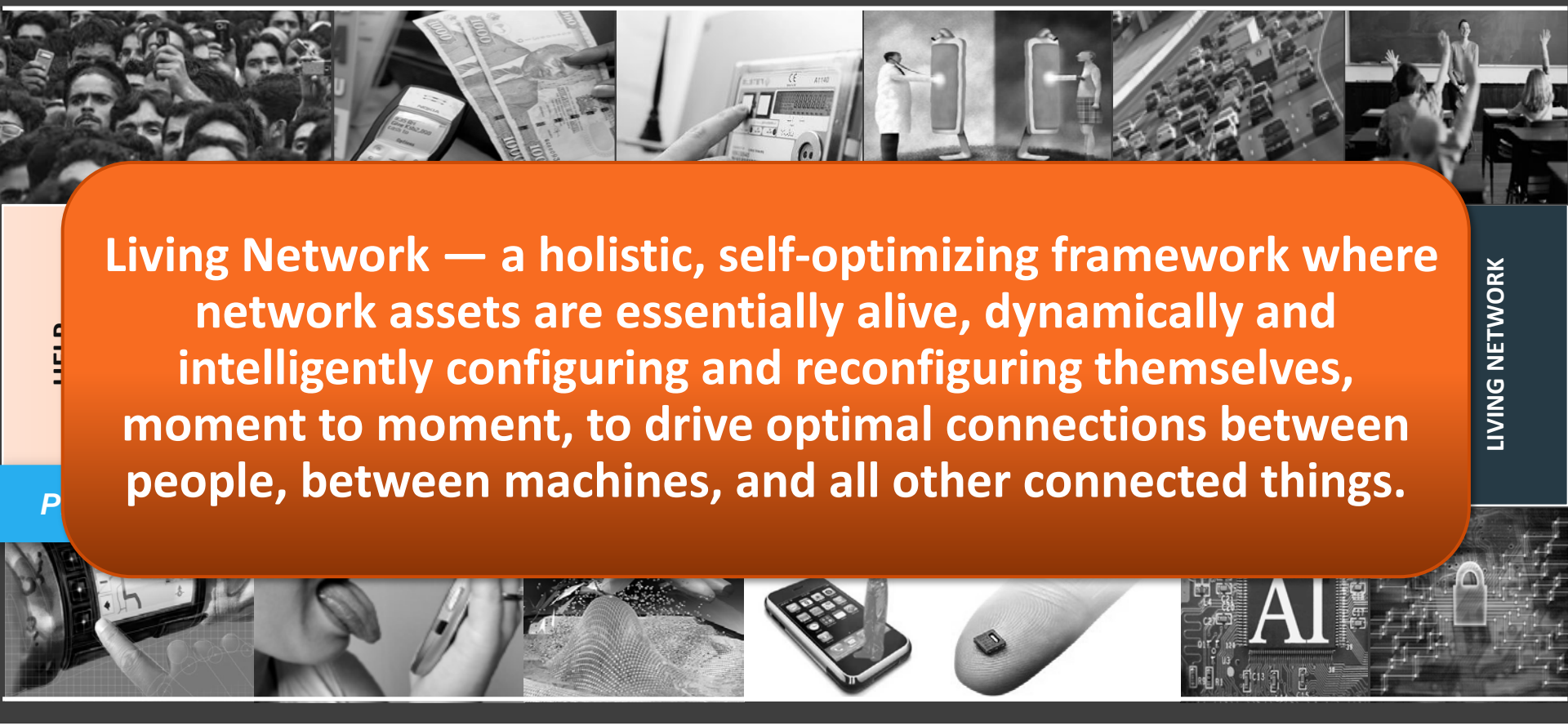
More Our Of Experiences Will Be *Shaped By A Living Network*

THE LIVING NETWORK REMOVES FRICTION, SIMPLIFIES OUR INTERACTIONS WITH OUR DEVICES & DELIVERS NEW EXPERIENCES

- Push into new verticals (finance, energy, wellness, healthcare, etc.) – wireless technology will be truly pervasive!



Living Network — a holistic, self-optimizing framework where network assets are essentially alive, dynamically and intelligently configuring and reconfiguring themselves, moment to moment, to drive optimal connections between people, between machines, and all other connected things.

- New form factors, user interfaces, plethora of new sensors & radios, analytics, etc.

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Some 5G Features to Support *the Living Network*

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In 5G We Will See *Smarter Air Interfaces Beyond LTE/WiFi*

AS BEFORE, IT WILL BE COMPLEX QUESTION OF TIMING, DRIVERS AND ENABLERS

1982 2G	1995 3G	2004 4G	To 5G	& Beyond
Mostly about **Spectral Efficiency**	*Increasingly about* **General Data** *support &* **Spectrum Flexibility**			
• Emergence of digital tech. • Affordable DSP technology • Forward error connection	• CDMA (Reuse=1) • Turbo codes • Advanced receivers	• Process node evolution • Incorporation of MIMO • Natural fit with OFDM	• **Waveforms for SDR** • **Wideband Digital Transceivers** • **Mature Spectrum Sensing** • ***x*-MIMO**	

Likely Air Interface Drivers For 5G:

- SPECTRUM AGILITY
- ENERGY EFFICIENCY
- APP AWARENESS

Small cells & sharing driving biggest gains:

- Makes sense to discuss new MAC/PHY/RF tech. to enable dynamic & new uses of spectrum

Energy crunch is just part of OPEX crunch:

- Makes sense to improve MAC/PHY/RF design to minimizes OPEX & build a greener world?

Context may hold key to untold efficiencies

- Makes sense to revisit protocol design to reflect real user behaviors that we can detect & see

* In 1982 CEPT forms GSM, In 1995 UMTS task force kicks off 3G, in 2004 first LTE RAN workshop

THANK YOU !!!

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