

LTE

Towards Mobile Broadband

DALLAS, TEXAS • JAN. 26-27, 2009



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LTE Business Case

January 26, 2009

Consulting Profile

Background

- 45+ Consulting Professionals
- Headquartered in Boston

Core Capabilities

- Specialists in the Communications, Media, and Technology Sectors
- Analytical Approach to Problem Solving
- Deep Economics and Financial Focus



Client Universe

-1- Operating Companies

- ➔ **Service Providers** (*CellCos, ILECs, CLECs, RLECs, IXCs, ASPs/ISPs/MSPs, etc.*)
- ➔ **Equipment Vendors**
- ➔ **Content Creators and Aggregators**

-2- Financial Investors

- ➔ **Private Equity Investors**
- ➔ **Hedge Funds**
- ➔ **Investment Banks**

Topic Overview

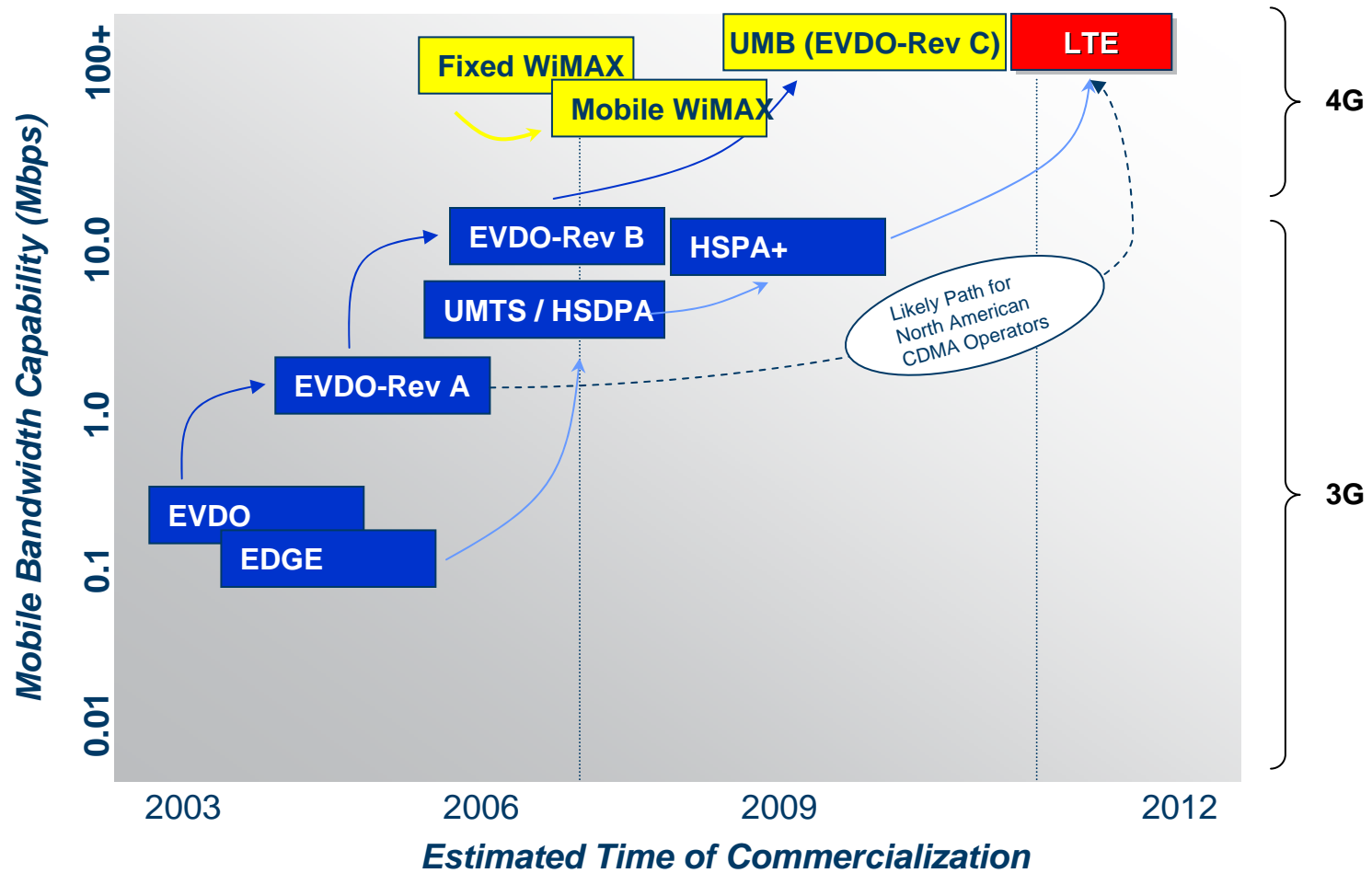
⇒ **Today's focus is on the LTE business case**

- ❑ *What are the revenue incentives and investment implications for operators who adopt LTE?*
- ❑ *What is the LTE market opportunity and implications for the broader ecosystem, including equipment providers, operators, and device manufacturers?*
- ❑ *How could the current economic climate impact the overall LTE business case?*

LTE Evolution

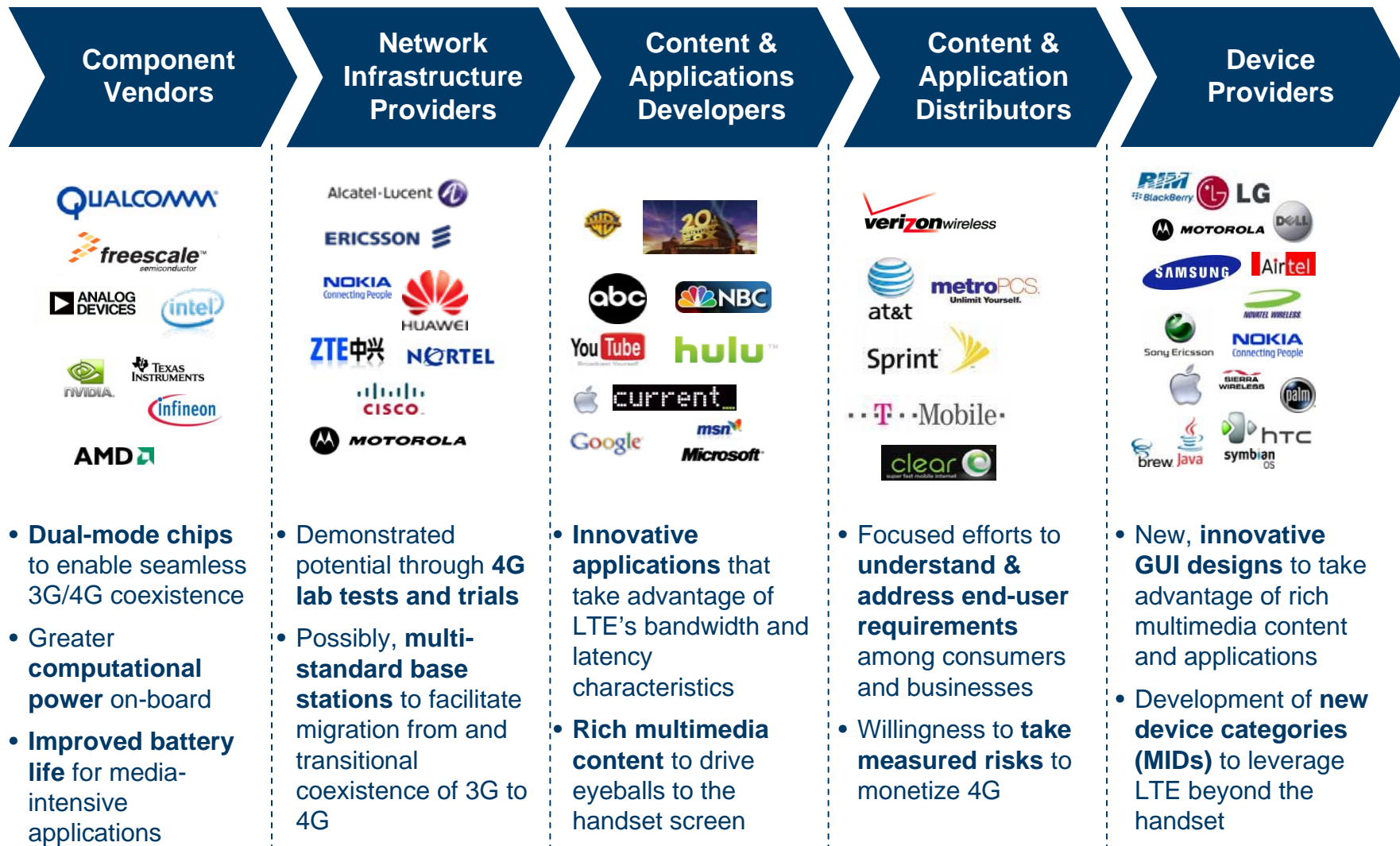
⇒ Carriers are beginning the transition to 4G

The Approaching Transition from 3G to 4G



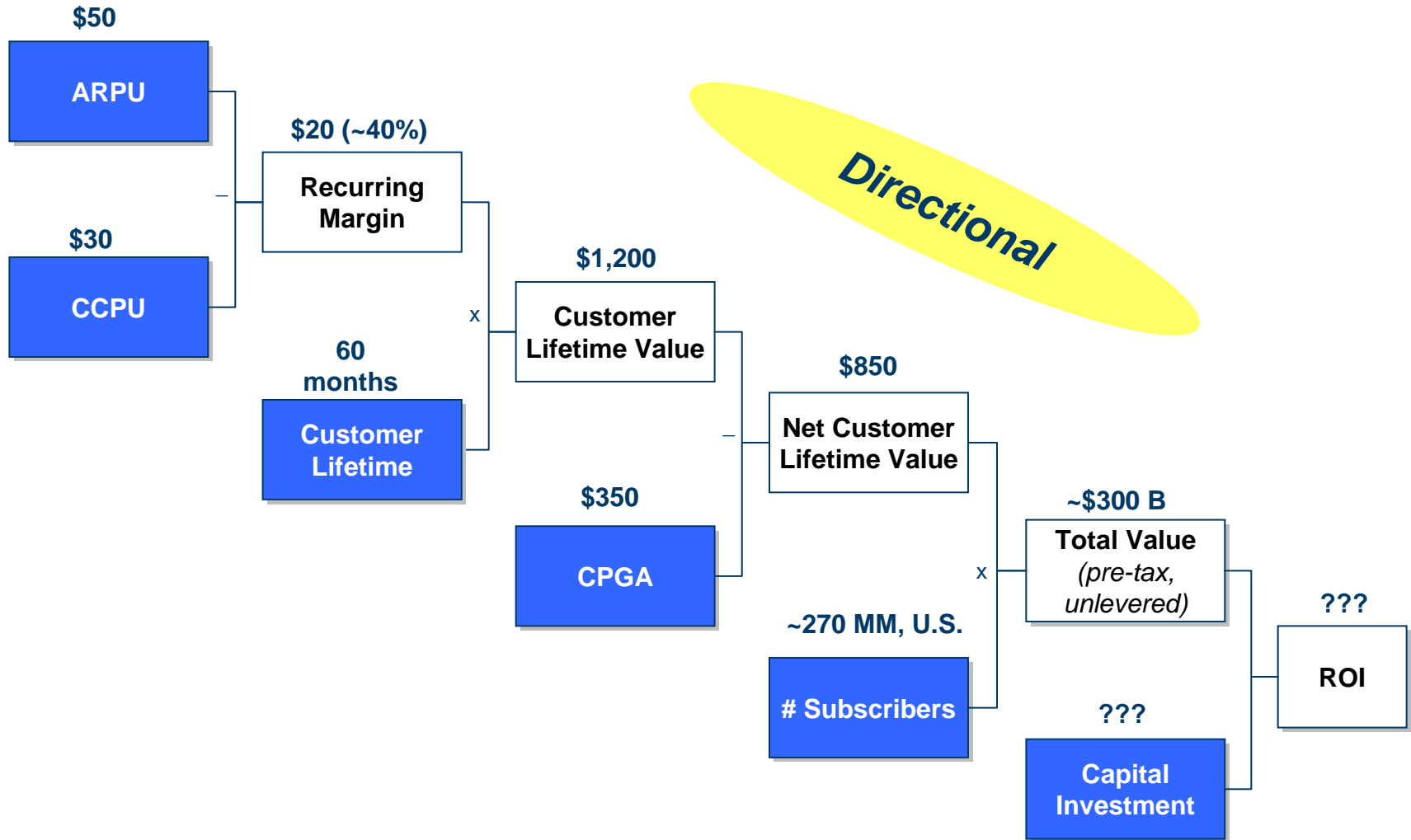
LTE Ecosystem

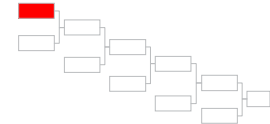
⇒ Each segment of the ecosystem has a role to play in LTE's success



LTE Business Case

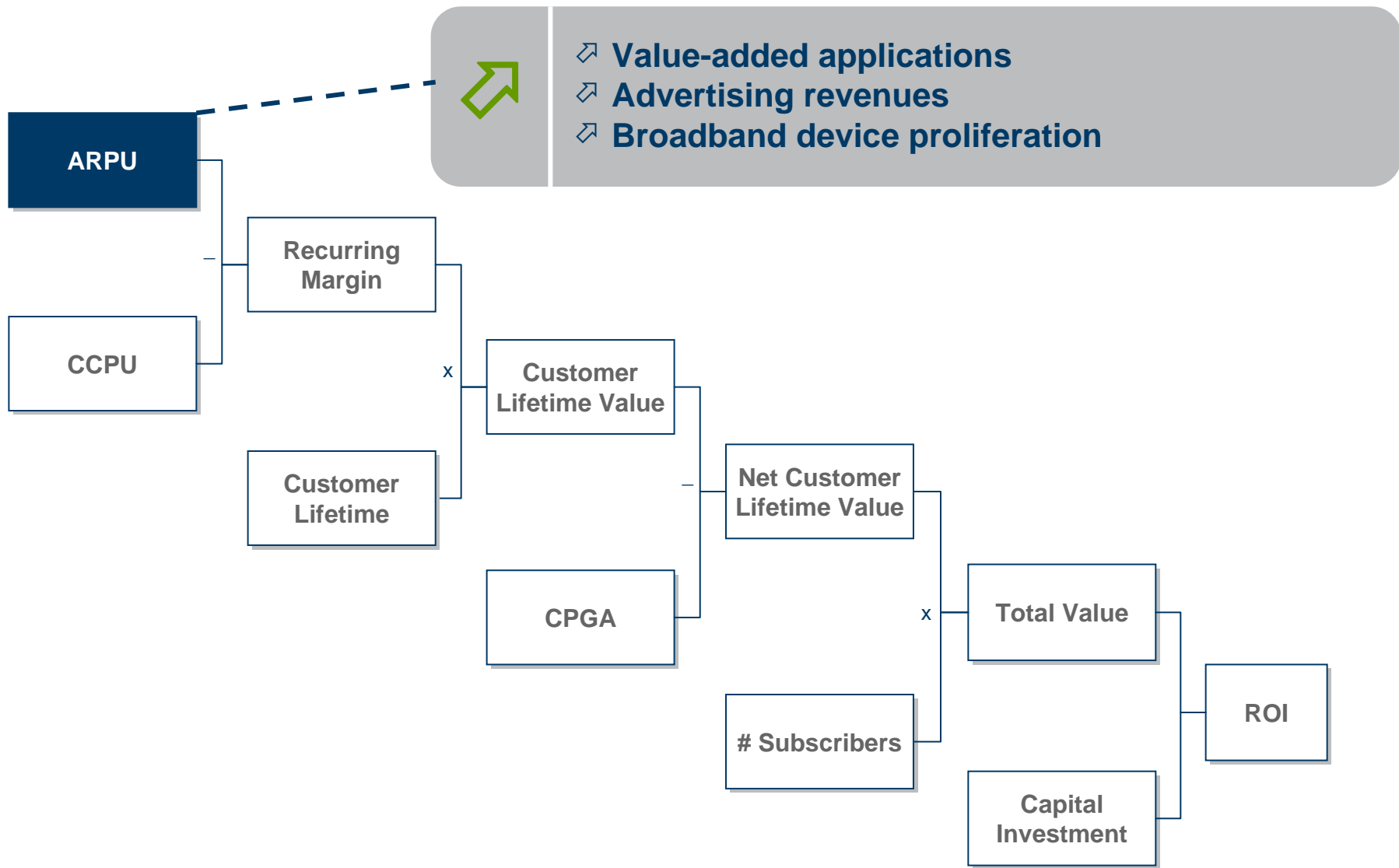
⇒ Success also rests on business case, and underlying economic drivers, for LTE

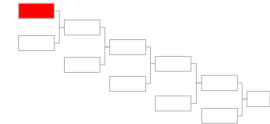




Economic Drivers: ARPU

⇒ ARPU stands to benefit from higher-bandwidth, lower-latency platform

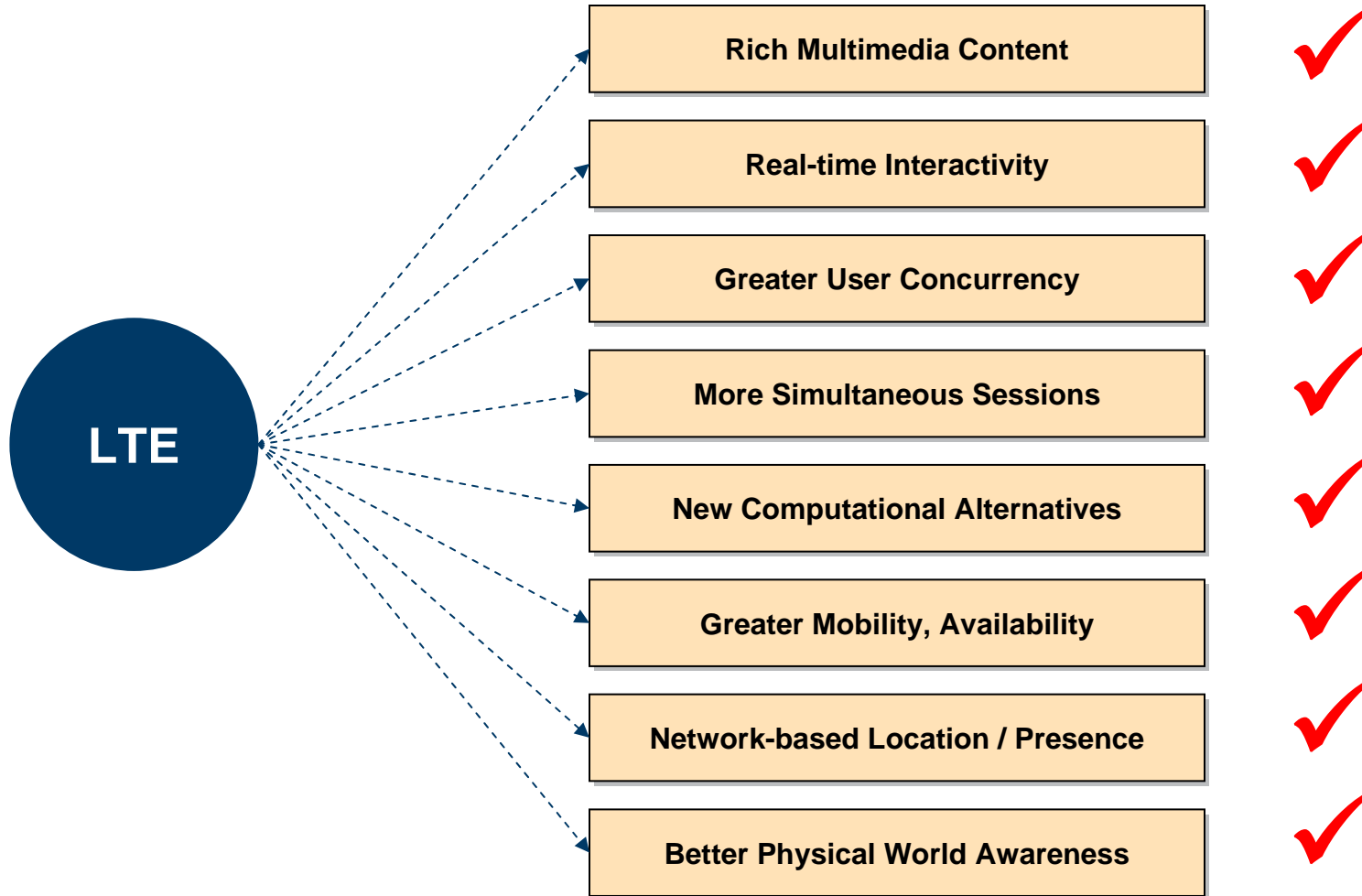


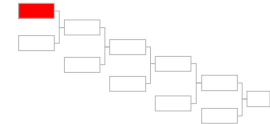


ARPU: Selected LTE Capabilities

⇒ Content and applications will benefit from LTE's capabilities relative to 3G

- 4G Application Enablers -

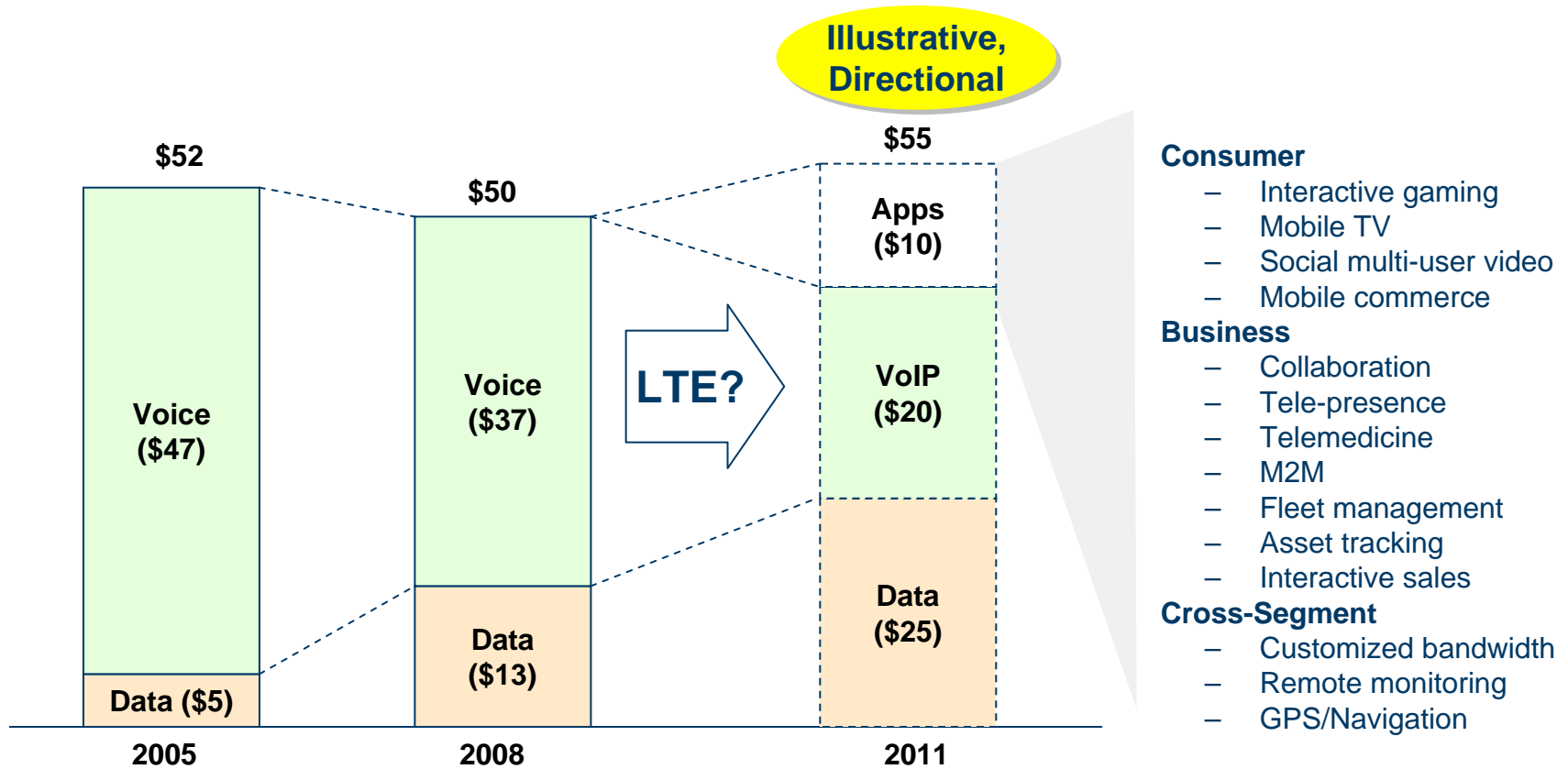


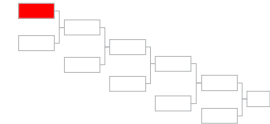


ARPU: Average ARPU Components

⇒ Value-added applications offset ARPU declines in other price components

- Consider the opportunity cost of inaction

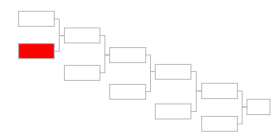




ARPU: Emerging Mobile Applications

⇒ A wide range of vertical and horizontal applications already are emerging

	Category	Example Companies
Horizontal Application	Collaboration	ZOHO, 37signals, BCS GLOBAL, Telstra™
	Computing and Storage	SoonR, amazon.com, IBM, Google
	Security and Monitoring	McAfee, LAIPAC TECH, Luminor
	Location-based Applications	Microsoft, MAPQUEST.
Vertical Applications	Emergency Response	APPEAR, ascom, RDIASOLUTIONS
	Pattern Recognition	AGENT2, cernium, snaptell
	Navigation and Tracking	AirClic, ATSC, BSM
	Surveillance	AVI, iMove, OnSSI
	Telemetry and Telecommand	Aerotel, PHILIPS, VECNA
	Interactive Sales	AmoNet, Interpoint, JARVIS
	Machine to Machine	KORE, sensorlogic, CINTERION

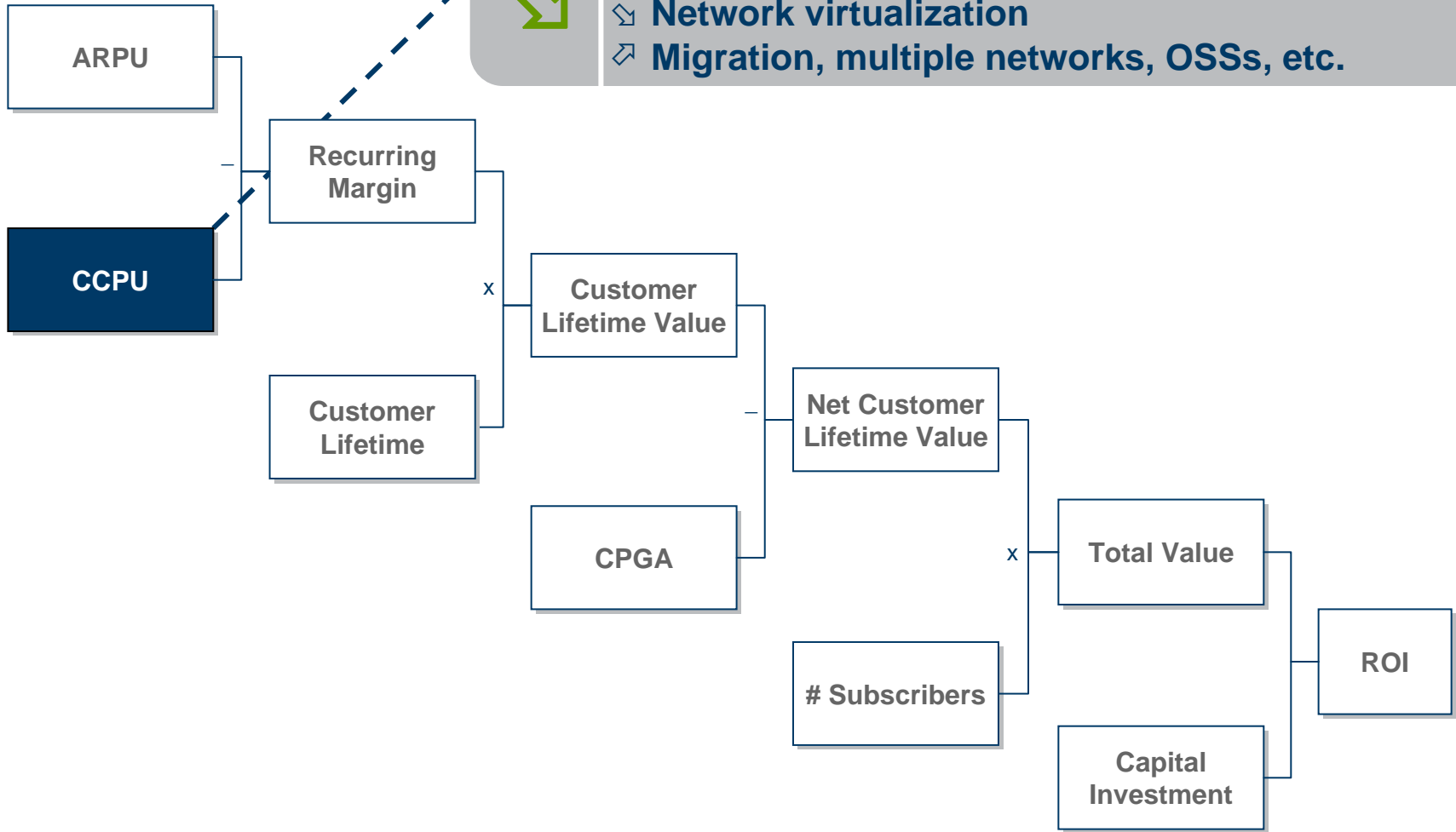


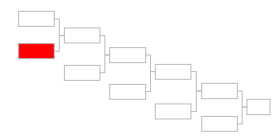
Economic Drivers: CCPU

⇒ LTE is likely to reduce operating costs over time, but with caveats

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- ⇨ All-IP networks
- ⇨ Backhaul
- ⇨ Network virtualization
- ⇨ Migration, multiple networks, OSSs, etc.

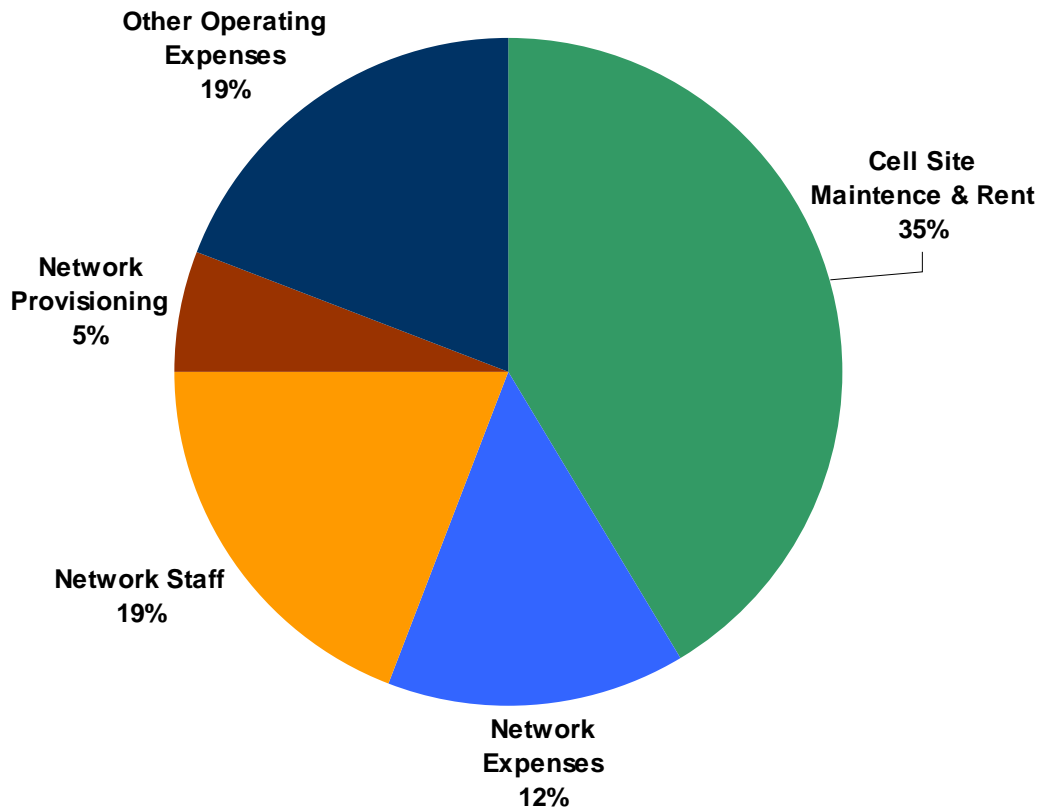




CCPU: Carrier Operating Costs

⇒ Switching to an end-to-end IP network with greater spectral efficiency can significantly reduce network expenses

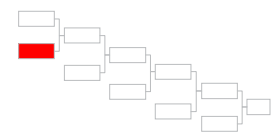
Wireless Network Operator OPEX Breakdown



LTE OPEX Impacts

Cell Site	<ul style="list-style-type: none"> Fewer sites and radios Reduced maintenance and part replacement costs
Network Expenses	<ul style="list-style-type: none"> Reduced switching and transport costs Better able to handle bursts of data Reduced backhaul costs (50% by some estimates)
Network Staffing	<ul style="list-style-type: none"> More remote (i.e., online) maintenance Fewer network elements (when fully converted)
Network Provisioning	<ul style="list-style-type: none"> Fully IP networks may simplify provisioning

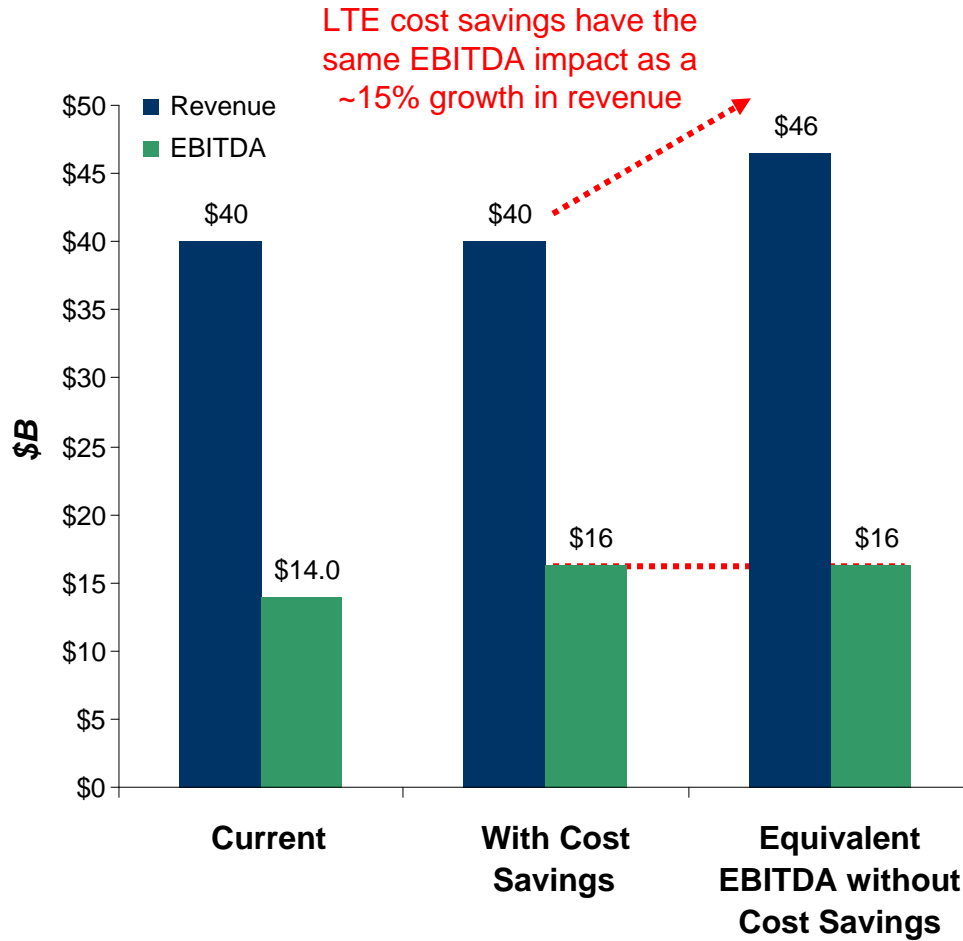
Source: AV&Co. Experience



CCPU: LTE Cost Cushion

↗ Cisco estimates up to 50% savings on backhaul for wireless carriers switching to LTE networks

Example of Potential EBITDA Impact



Assumptions

General Assumptions

- Revenue of \$40Bn
- COGS = 40% of Revenue
- Backhaul = 25% of COGS
- SG&A = 20% of Revenue

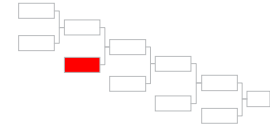
Cost Savings Assumptions

- Switching to a 4G network will result in a 50% reduction to backhaul costs

Predicated Cost Savings

- Gross margin increases to 65% from 60%
- EBITDA margin improvement of 5% (~40% to ~45%)
- Cost savings create EBITDA contribution equivalent to ~15% growth in revenue

Sources: Cisco

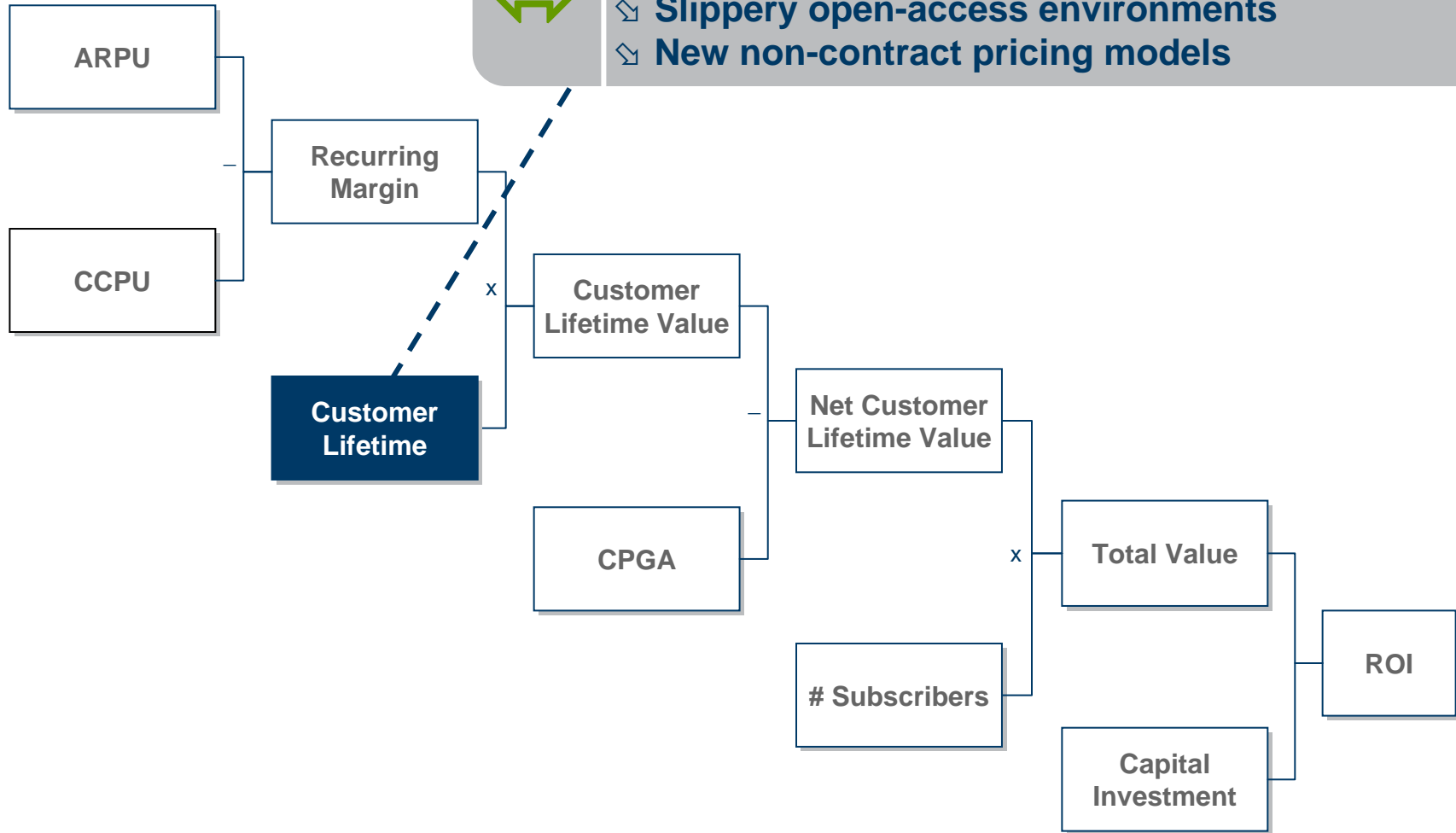


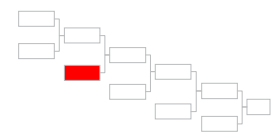
Economic Drivers: Churn

⇒ Customer lifetime may improve, but the outlook remains ambiguous

↔

- ↗ Sticky 4G applications
- ↗ More devices per user
- ↘ Slippery open-access environments
- ↘ New non-contract pricing models

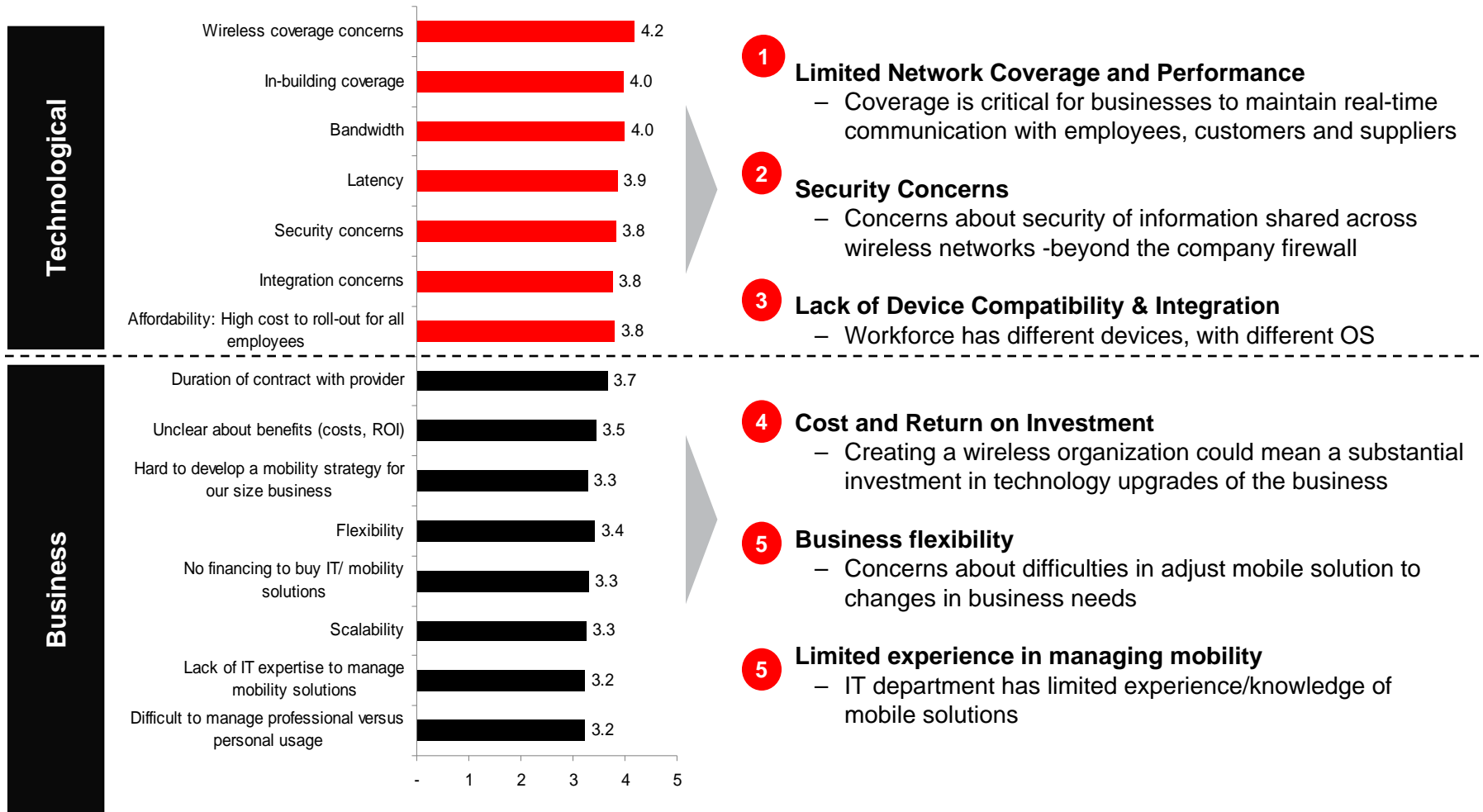




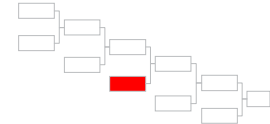
Churn: SMBs, Enterprises

⇒ Don't forget SMBs and Enterprises

SMB Mobility Barriers to Adoption



Source: AV&CO primary research survey, n=500

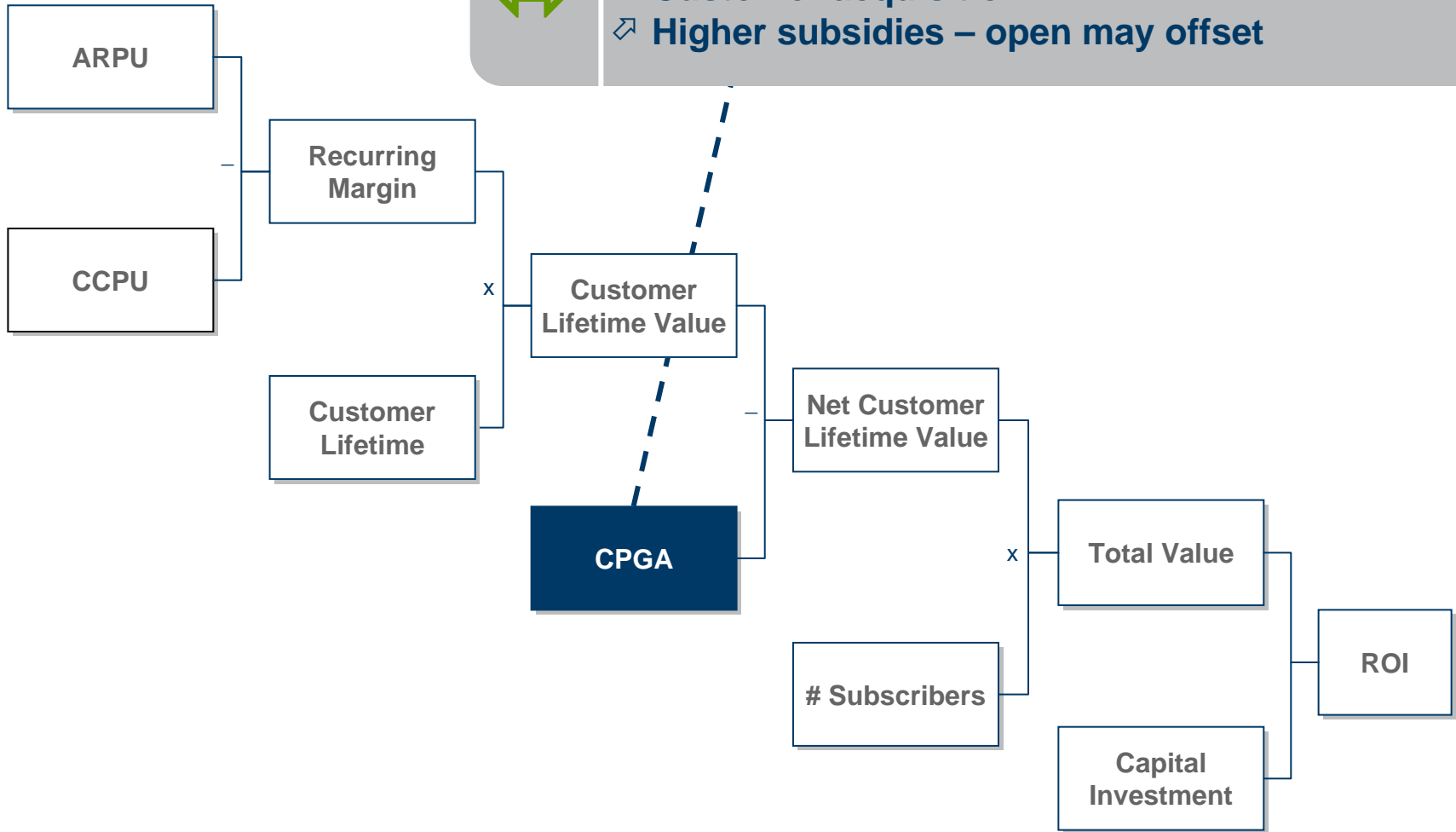


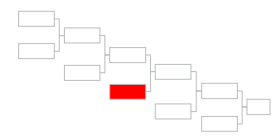
Economic Drivers: CPGA

⇒ LTE's impact on CPGA remains uncertain

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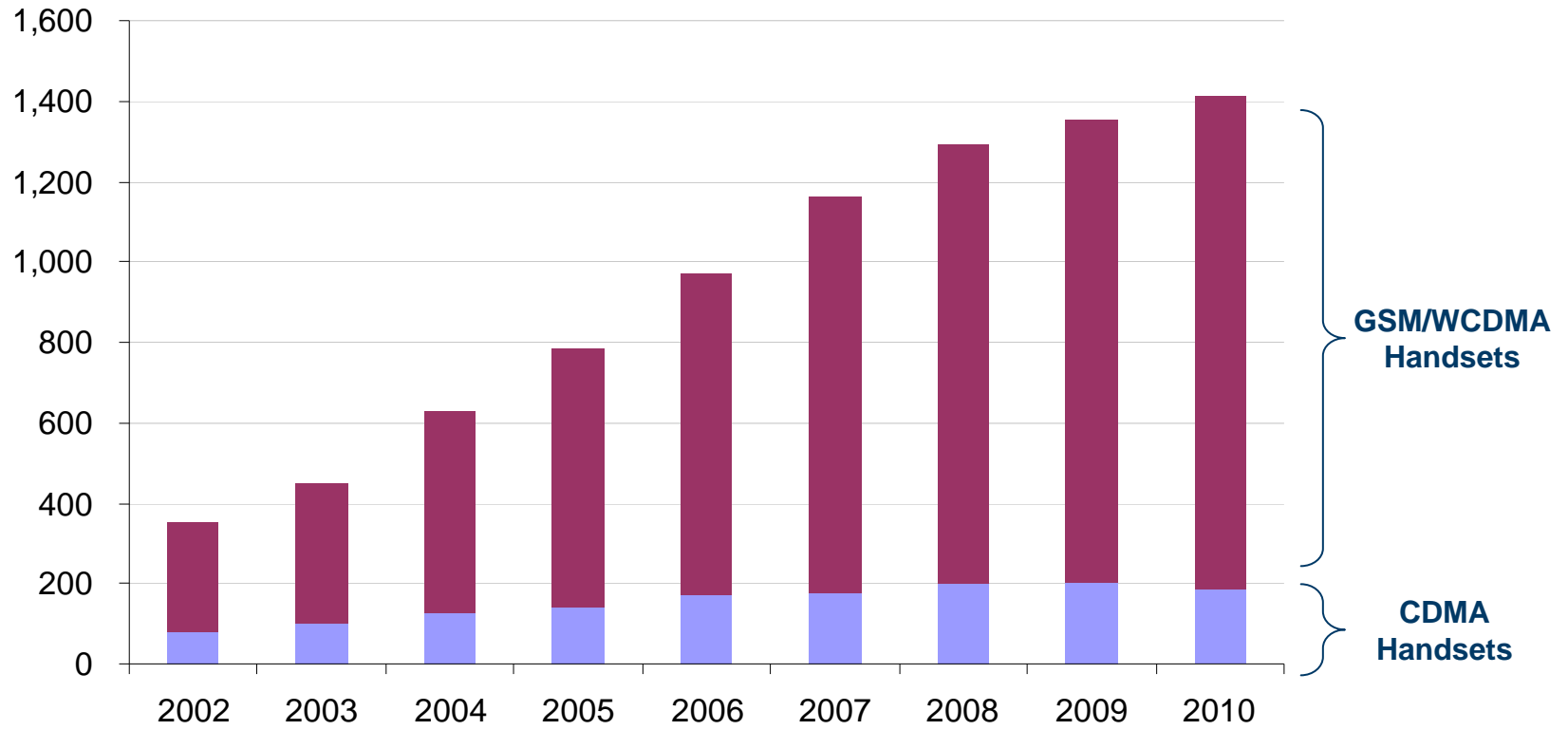
- ⊘ Economies of scale
- ⊘ Customer acquisition
- ⊘ Higher subsidies – open may offset

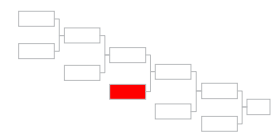




CPGA: Economies of Scale

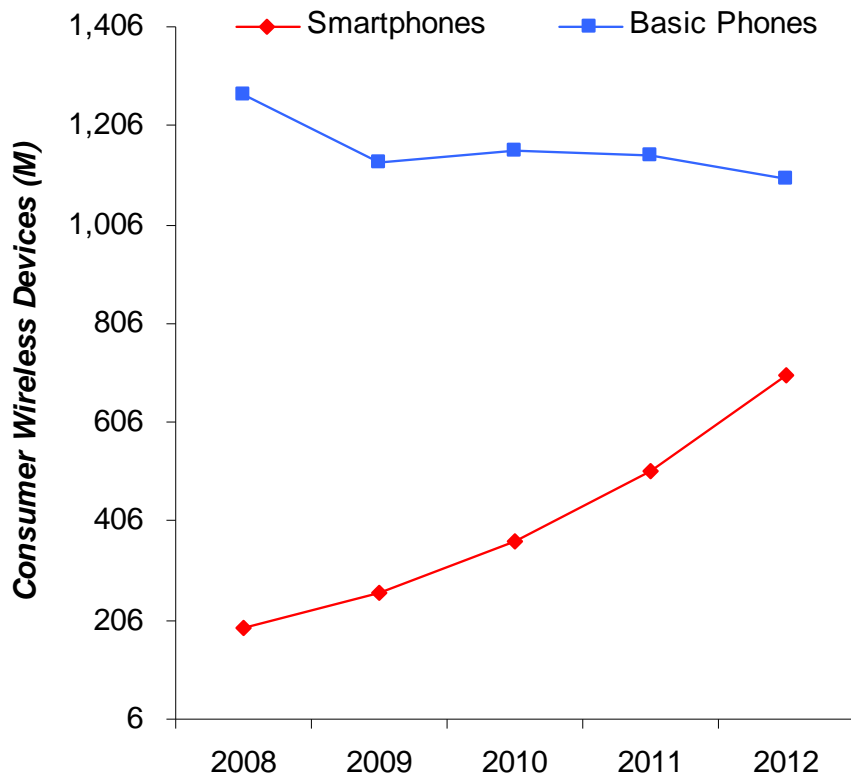
⇒ Scale economies from promise to drive down equipment subsidies



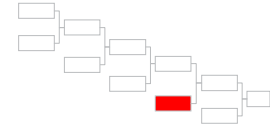


CPGA: Smartphones

⇒ **Yet, greater adoption of smartphones and other advanced devices may offset benefits from scale economies, at least in the near-term**



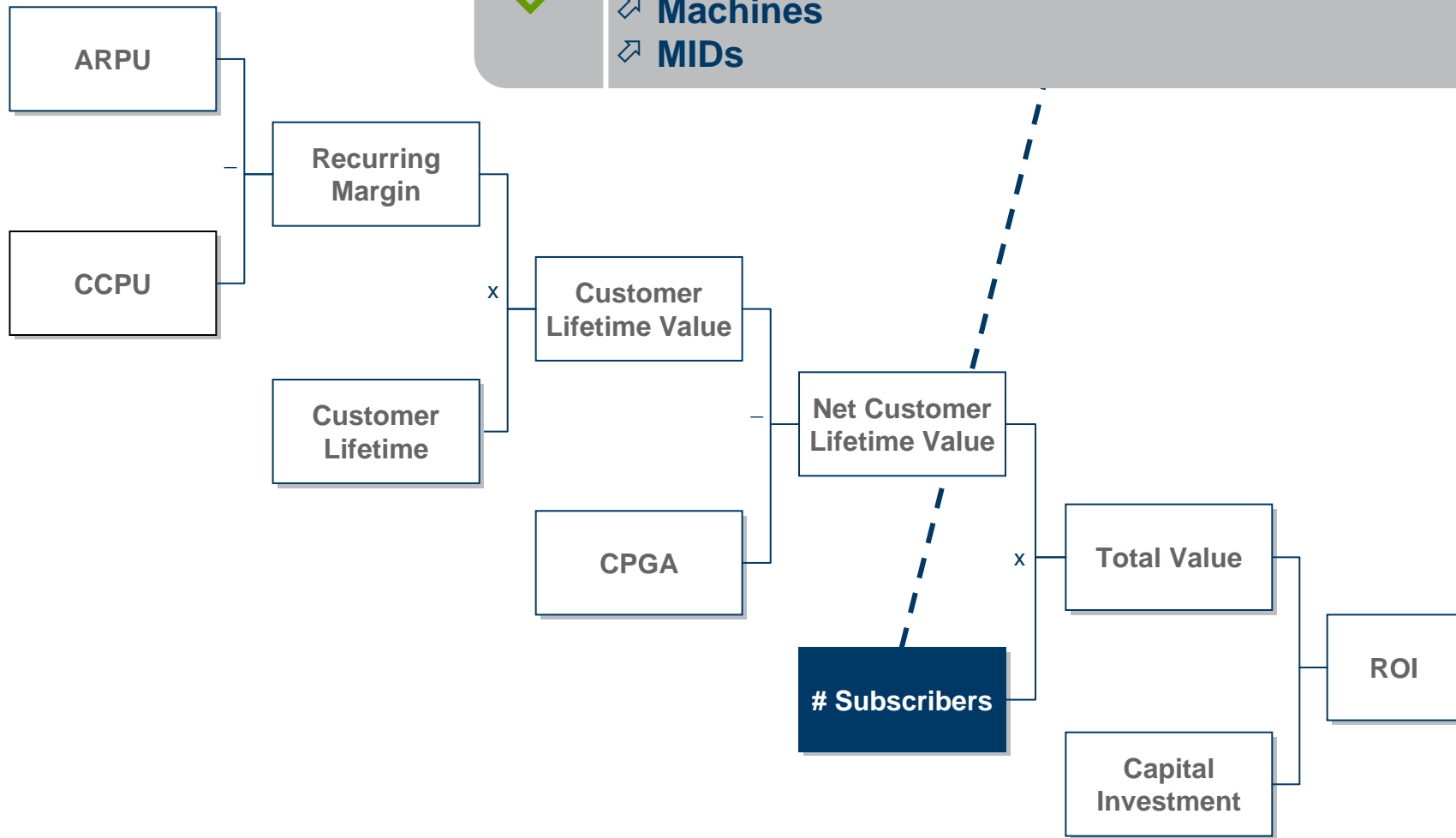
- **Smartphones use more data than basic phones**
- **iPhone users consume 30 times the data of other smart phones users (e.g., Youtube)**
- **Even if smartphone penetration growth slows, existing smartphones are becoming much more data intensive to match the iPhone**

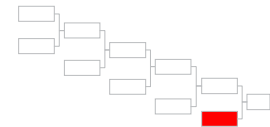


Economic Drivers: Subscribers

⇒ LTE seems likely to attract new subscribers and more devices per subscriber

 **New applications tap new segments**
Greater bandwidth targets performance hold-outs
Machines
MIDs

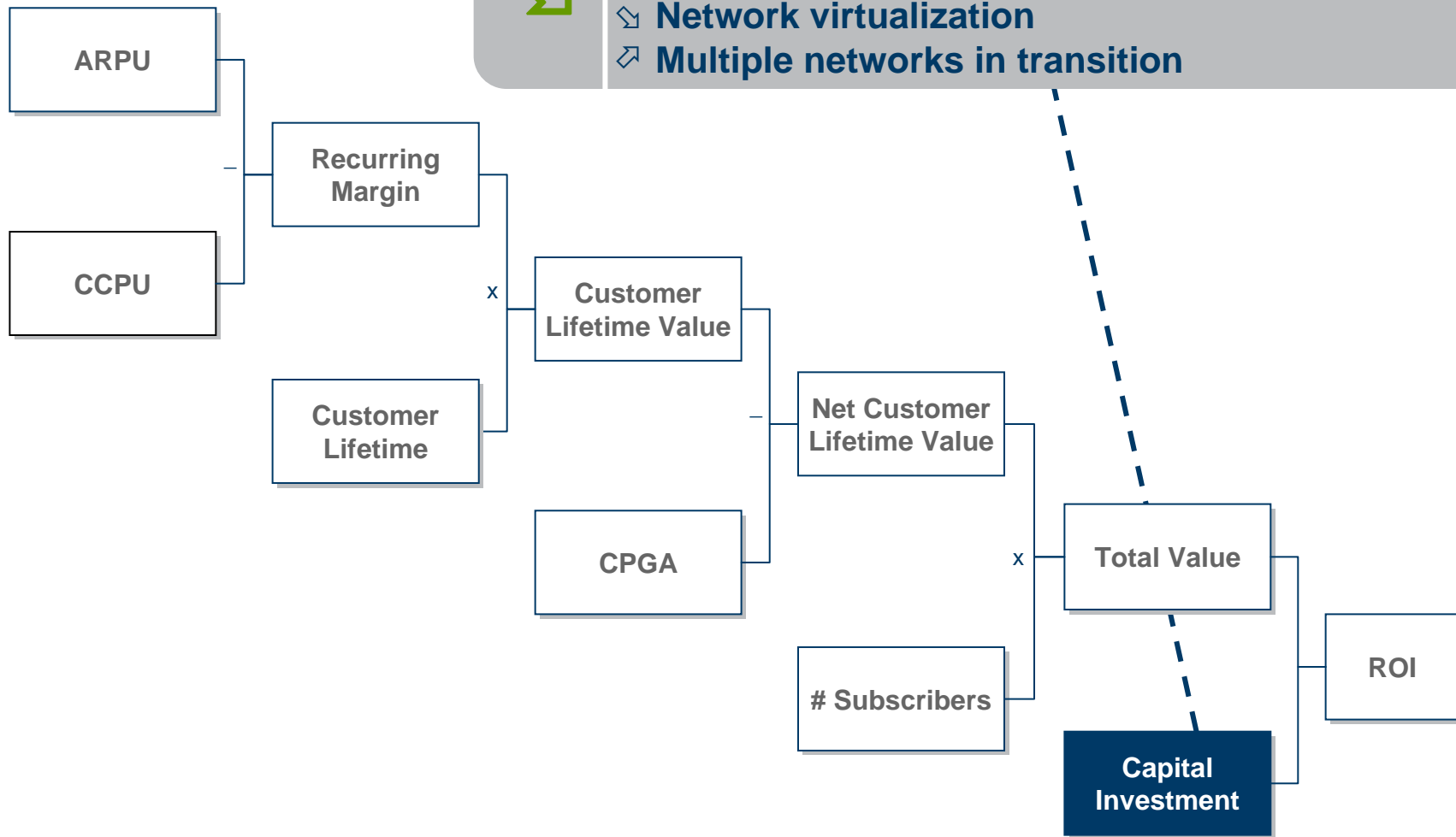


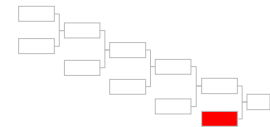


Economic Drivers: CapEx

⇒ Capital efficiency is set to improve with LTE deployments

 Economies of scale
All-IP network & spectral efficiency
Network virtualization
Multiple networks in transition

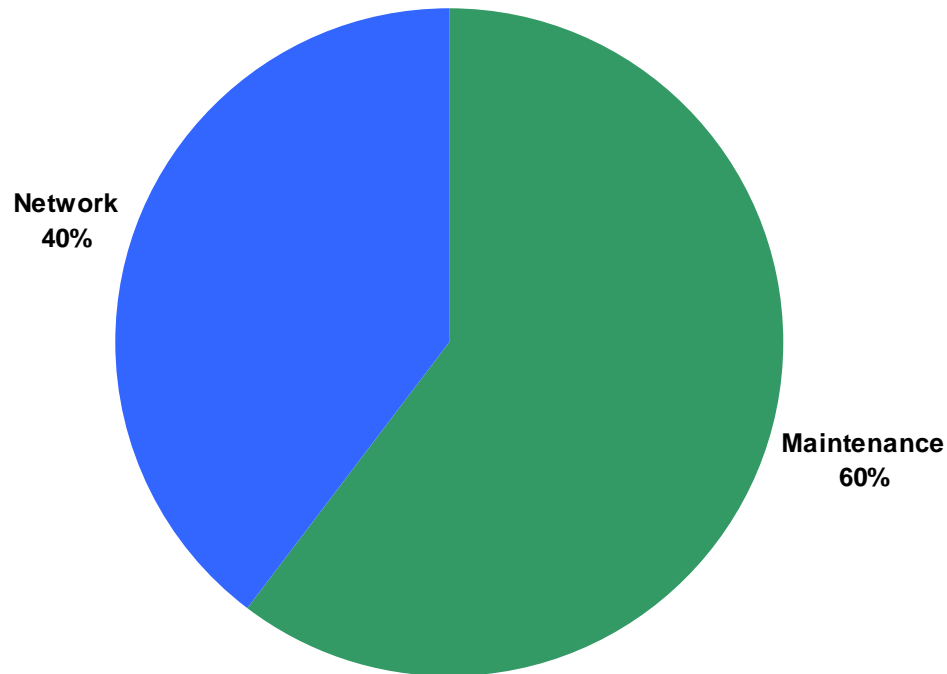




CapEx: All-IP

⇒ Standardized, IP-based network equipment for LTE will reduce capital costs

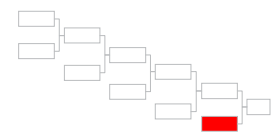
**Wireless Network Operator
CAPEX Breakdown**



LTE CAPEX Impacts

Cell Site	<ul style="list-style-type: none">• Improved spectrum efficiency• Propagation benefits of 700 MHz spectrum• Spectrum flexibility (channel width, FDD/TDD)
Network Maintenance	<ul style="list-style-type: none">• Simpler network architecture• Lower equipment costs resulting from standardization
Network Expansion	<ul style="list-style-type: none">• Lower equipment costs resulting from standardization• Simpler network architecture

Source: AV&Co. Experience



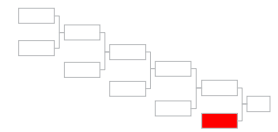
CapEx: Impact of Spectral Efficiency

⇒ Improved spectral efficiency of LTE promises to further enhance the capital efficiency of LTE investments

LTE – 3G Comparison

	- LTE -	- EVDO Rev-A -	- HSDPA -
Theoretical Speed	DL- >100 Mbps UL- >50 Mbps	DL- 3.1 Mbps UL- 1.8 Mbps	DL- 14 Mbps UL- 5.8 Mbps
Expected Speed	DL- 5 Mbps	DL- 400 kbps	DL- 900 kbps
Spectrum Efficiency	~3-5 bps/Hz	~1-2 bps/Hz	~1-3 bps
Channel Bandwidth	1.25-20 MHz	1.25 MHz	5 MHz (Future plans for 10 MHz)
Range	1-30 Miles (theoretical)	1-5 Miles	1-5 Miles

Source: Ericsson, Alcatel, Qualcomm, Wireless World, AV&Co. interviews with RF engineers



Macroeconomic Considerations

⇒ Investments may be impacted by the current economic climate

□ *Barriers*

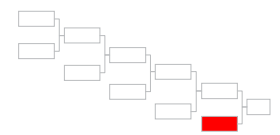
- Tight credit markets; depressed equity markets; cash is king
- Declining consumer demand

□ *Drivers*

- Operators' subscription cash flows
- Competitive intensity
- Market saturation

□ *Wildcards*

- Economic stimulus
- Cost of capital









Macroeconomic Considerations

⇒ Despite economic headwinds, participants across the ecosystem are gearing up for LTE

- ❑ *December '08: **Qualcomm** laid out an aggressive LTE roadmap (expect to have samples ready by Q209)*
- ❑ *December '08: **Alcatel-Lucent** announced an increase in LTE investment*
- ❑ *November '08: **Motorola** completed its first field test for LTE – expect limited LTE deployments in 2009*
- ❑ *December '08: **Nokia** demonstrated LTE technology*
- ❑ *November '08: **HTC** introduced MAX 4G, the world's first GSM & WiMAX enabled handset in Russia*
- ❑ *October '08: **ZTE** increases LTE R&D investment as they believe the global recession will not dampen equipment demand for LTE*
- ❑ *November '08: **T-Mobile** announced plans to forego additional investment into HSPA+ and focus exclusively on LTE*
- ❑ *December '08: **Verizon** states that LTE service will be launched in 2009 in select U.S. markets*
- ❑ *January, '09: **TeliaSonera** awards first LTE contract*

Conclusions

	Potential Impact	Rationale
ARPU		<ul style="list-style-type: none"> ⊞ Value-added applications ⊞ Advertising revenues ⊞ Broadband device proliferation
CCPU		<ul style="list-style-type: none"> ⊞ All-IP networks ⊞ Backhaul ⊞ Network virtualization ⊞ Migration, multiple networks, OSSs, etc.
Customer Lifetime		<ul style="list-style-type: none"> ⊞ Sticky 4G applications ⊞ More devices per user ⊞ Slippery open-access environments ⊞ New non-contract pricing models
CPGA		<ul style="list-style-type: none"> ⊞ Economies of scale ⊞ Customer acquisition ⊞ Higher subsidies – open may offset
Subscribers		<ul style="list-style-type: none"> ⊞ New applications tap new segments ⊞ Greater bandwidth targets performance hold-outs ⊞ Machines ⊞ MIDs
CapEx		<ul style="list-style-type: none"> ⊞ Economies of scale ⊞ All-IP network & spectral efficiency ⊞ Network virtualization ⊞ Multiple networks in transition