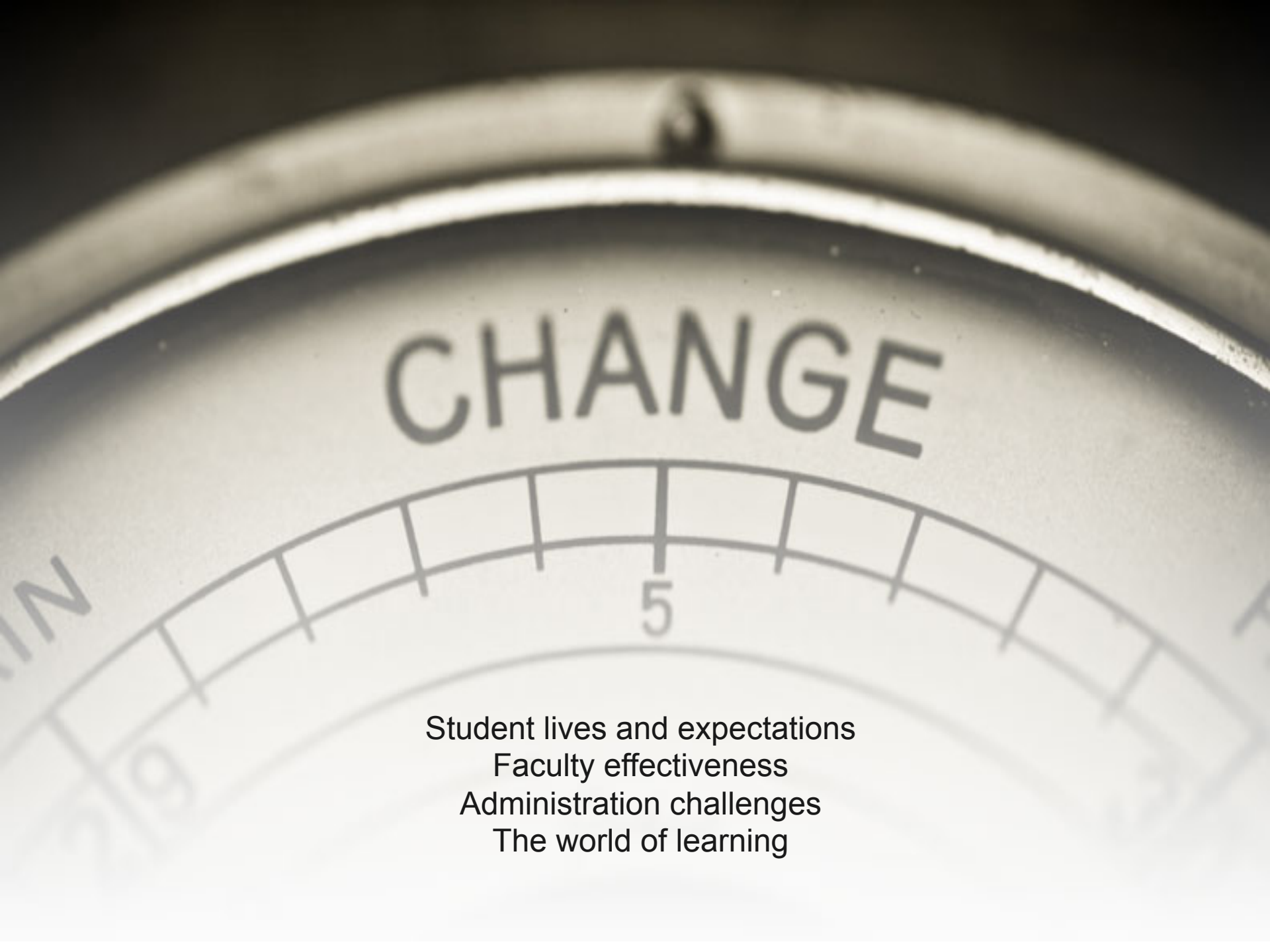


Trends and Technologies Impacting Higher Education

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Trends in Higher Education

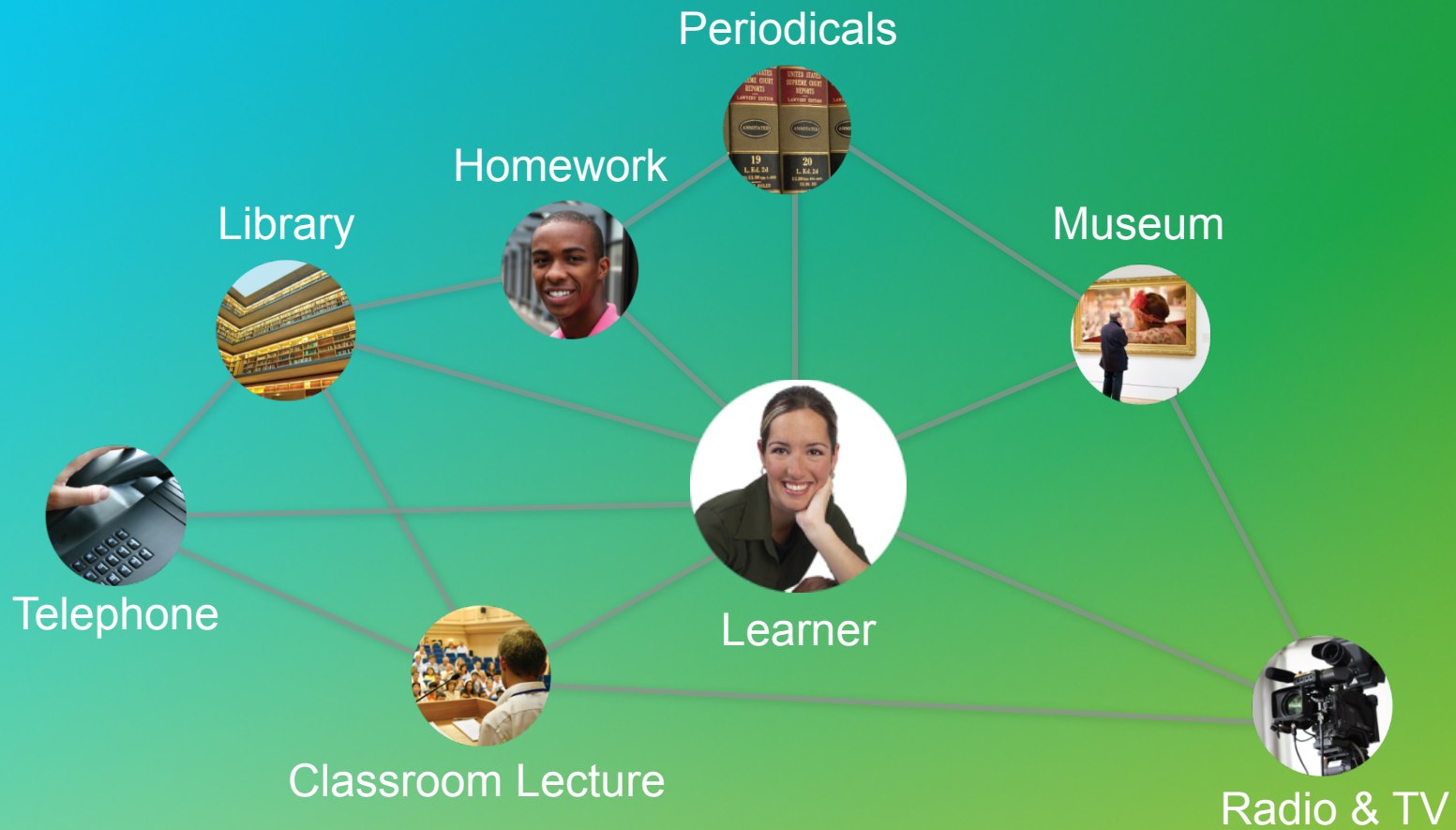


CHANGE

Student lives and expectations
Faculty effectiveness
Administration challenges
The world of learning

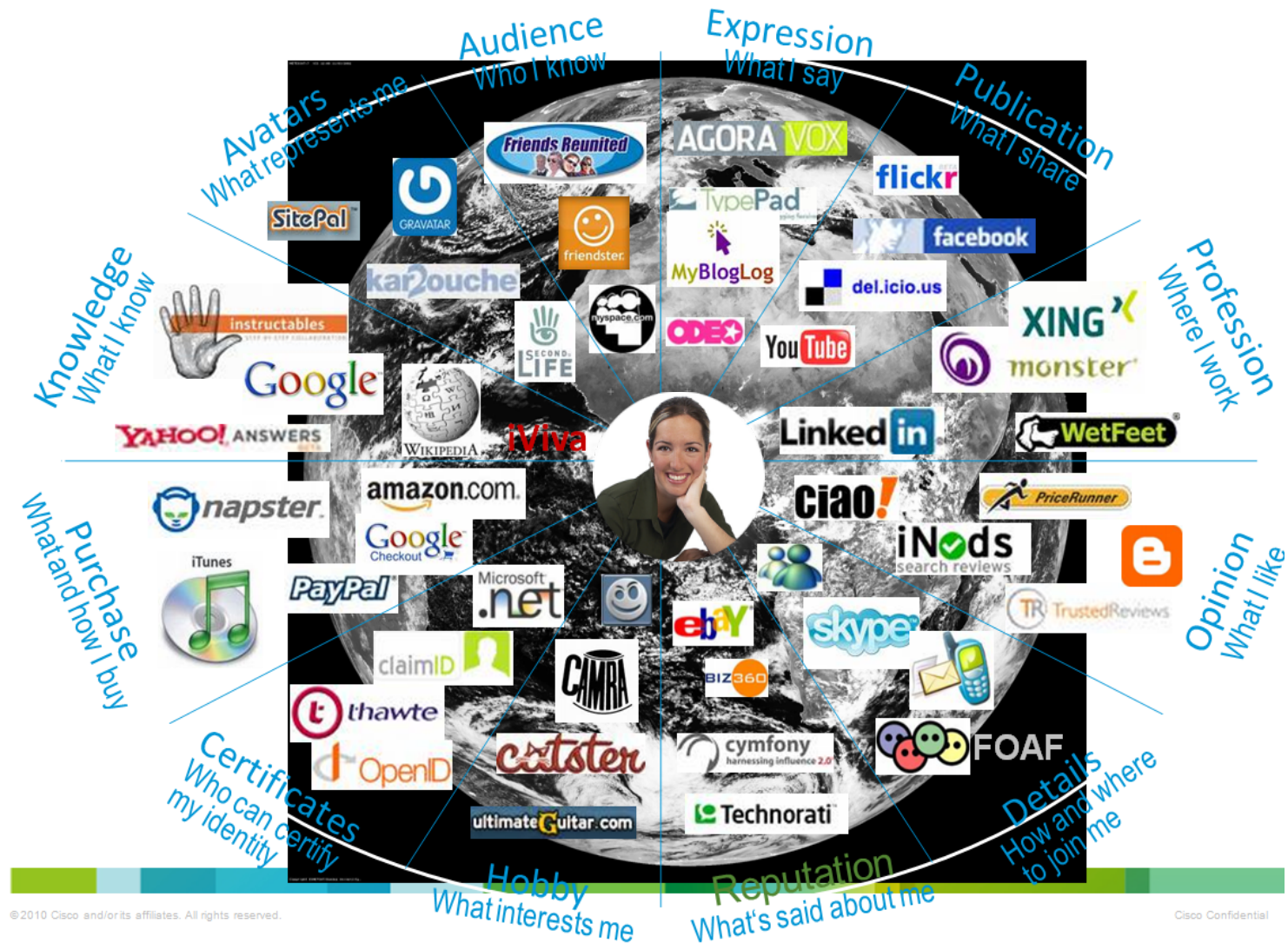
The Learner's World Has Changed

A generation ago...



The Learner's World Has Changed

The student's "digital nervous system" Today...



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Cisco Confidential

And Collaboration is Changing Learning

More peer-to-peer learning, broader source access



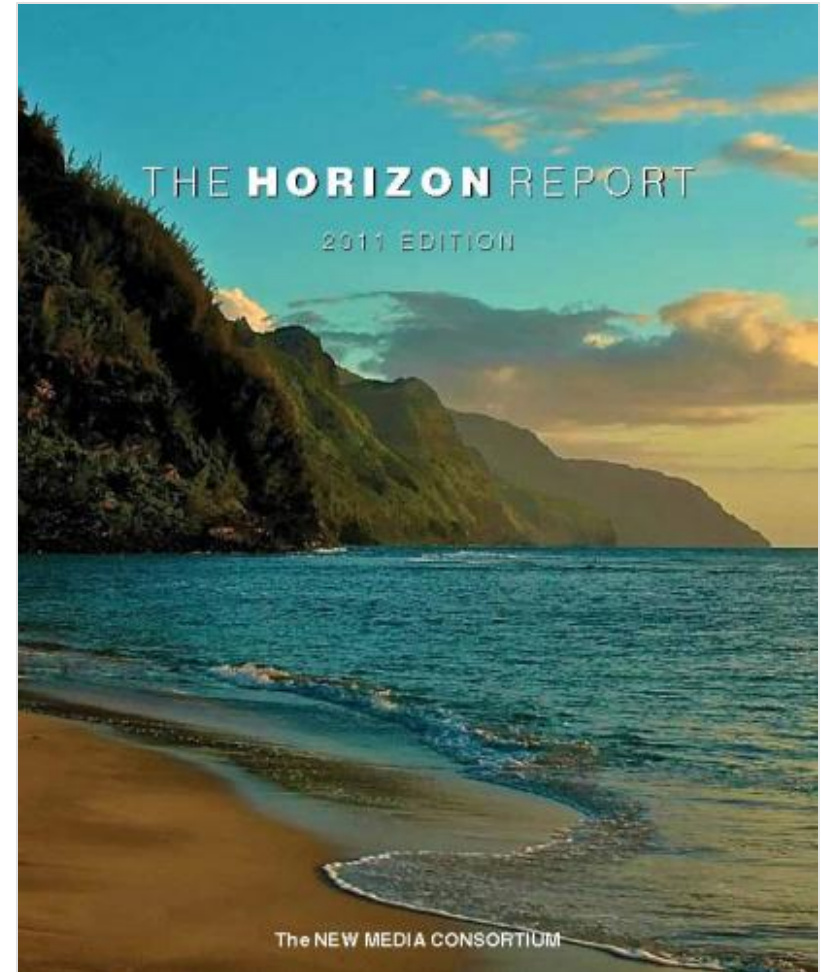
“...collaboration requires connecting people and ideas outside an organization to those inside it, leveraging diverse talent, modeling collaborative behavior at the top, and showing a strong hand to keep teams from getting mired in debate.”

Harvard Business Review
July-August 2011

Horizon Report 2012 – Key Trends

Network, mobility, cloud take center-stage in higher education

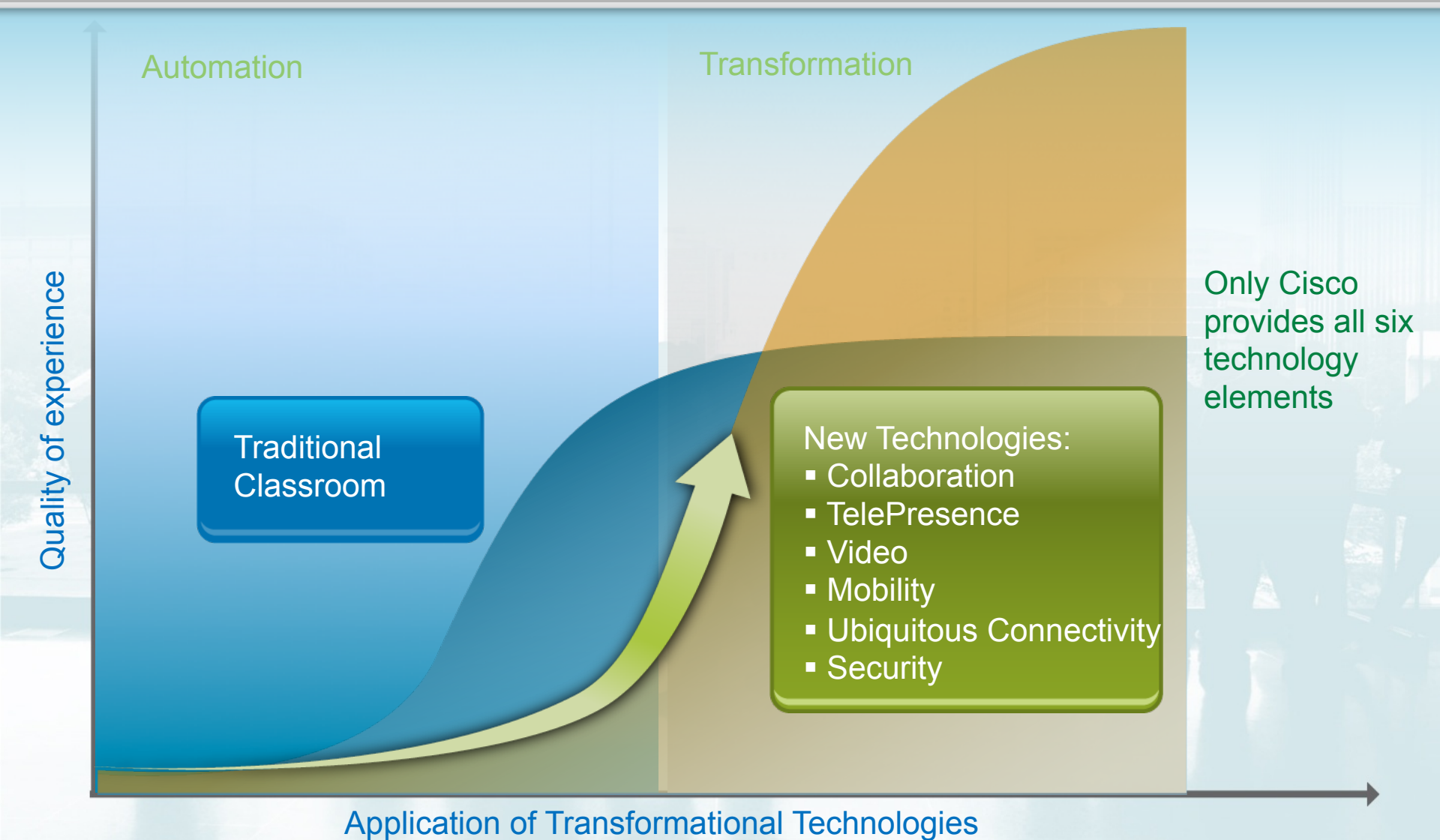
- *With personal access to the Internet from mobile devices on the rise, **students' easy and pervasive access to information outside of formal campus resources** continues to encourage educators to take a careful look at the ways we can best serve learners.*
- ***The world of work is increasingly collaborative**, giving rise to reflection about the way student projects are structured.*
- *The **technologies we use are increasingly cloud-based**, and our notions of IT support are decentralized*



In the next five years, our education delivery system will change more than it has in the last thirty.

Technology Moves from Automate to “Transform”

Learning now becoming networking, video, collaboration



The Connected Learning Experience

Virtual *and* bricks-and-mortar



Content-intensive



Video-intensive



Collaborative
Platforms



Location
Independent

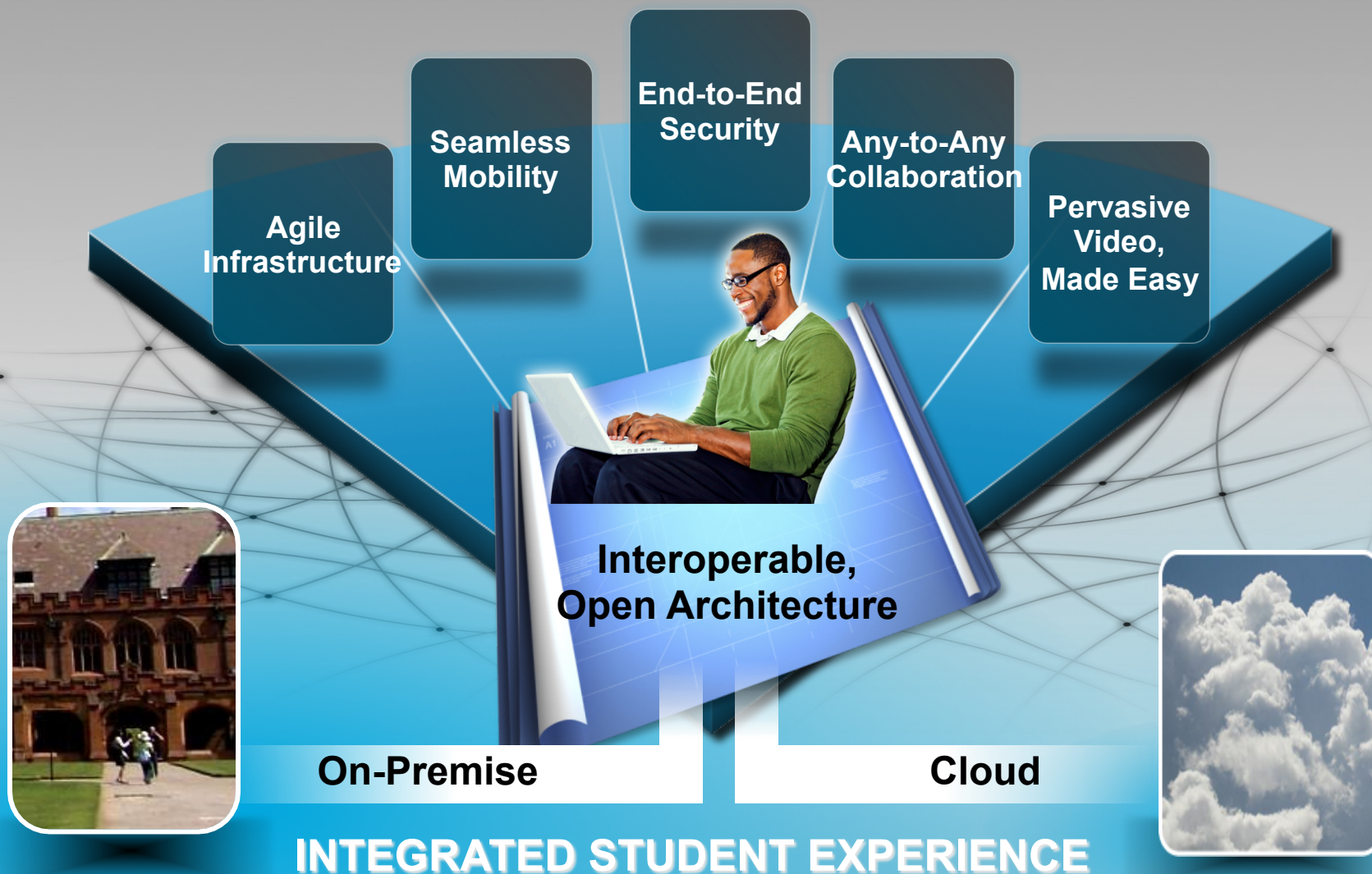


Device
Independent



***One teacher, many classrooms,
global delivery***

Creates an Integrated Student Experience



Technology Megatrends



Today, more than **99% of things** in the physical world **are still not connected to the Internet.**

But a phenomenon called "The Internet of Everything" will wake up **everything** you can imagine.

By 2020, **37 billion intelligent things** will be connected to the Internet.

Internet of Everything connects the physical world to the Internet.

Using microensors on the network, everyday objects become connected and intelligent.

The Internet of EVERYTHING

#InternetofEverything #IoE CISCO



CISCO

Data is the new oil.

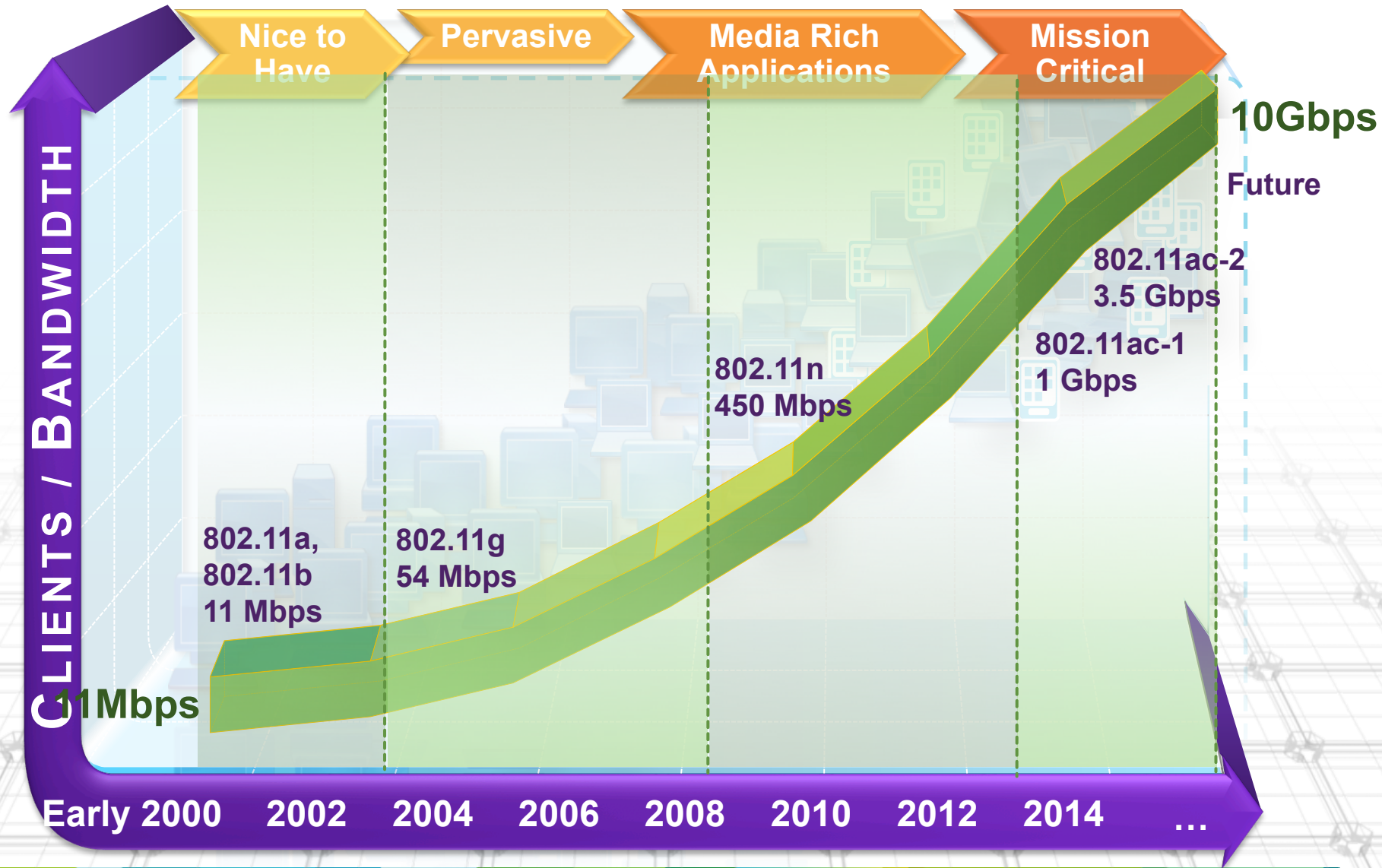
We see in data the same transformative, wealth-creating power that 19th-century visionaries once sensed in the crude black ooze trapped underground.

If "crude" data can be extracted, refined, and piped to where it can impact decisions in real time, its value will soar. And if data can be properly shared across an entire ecosystem and made accessible in the places where analytics are most useful, then it will become a true game changer, altering the way we live, work, learn, and play.

Source: Cisco IBSG, 2012. #DatainMotion



Wireless Standards, increasingly demanding network resources



IMMERSIVE
COLLABORATION
Pervasive Video

CUSTOMER THE NETWORK CHALLENGES

MOBILITY
BYOD

CLOUD
SaaS |
DC/V



SECURITY



IT PRODUCTIVITY

Google

LinkedIn

facebook

Cisco
webex

salesforce.com
Success On Demand

Higher Education Unified Access



ANYWHERE



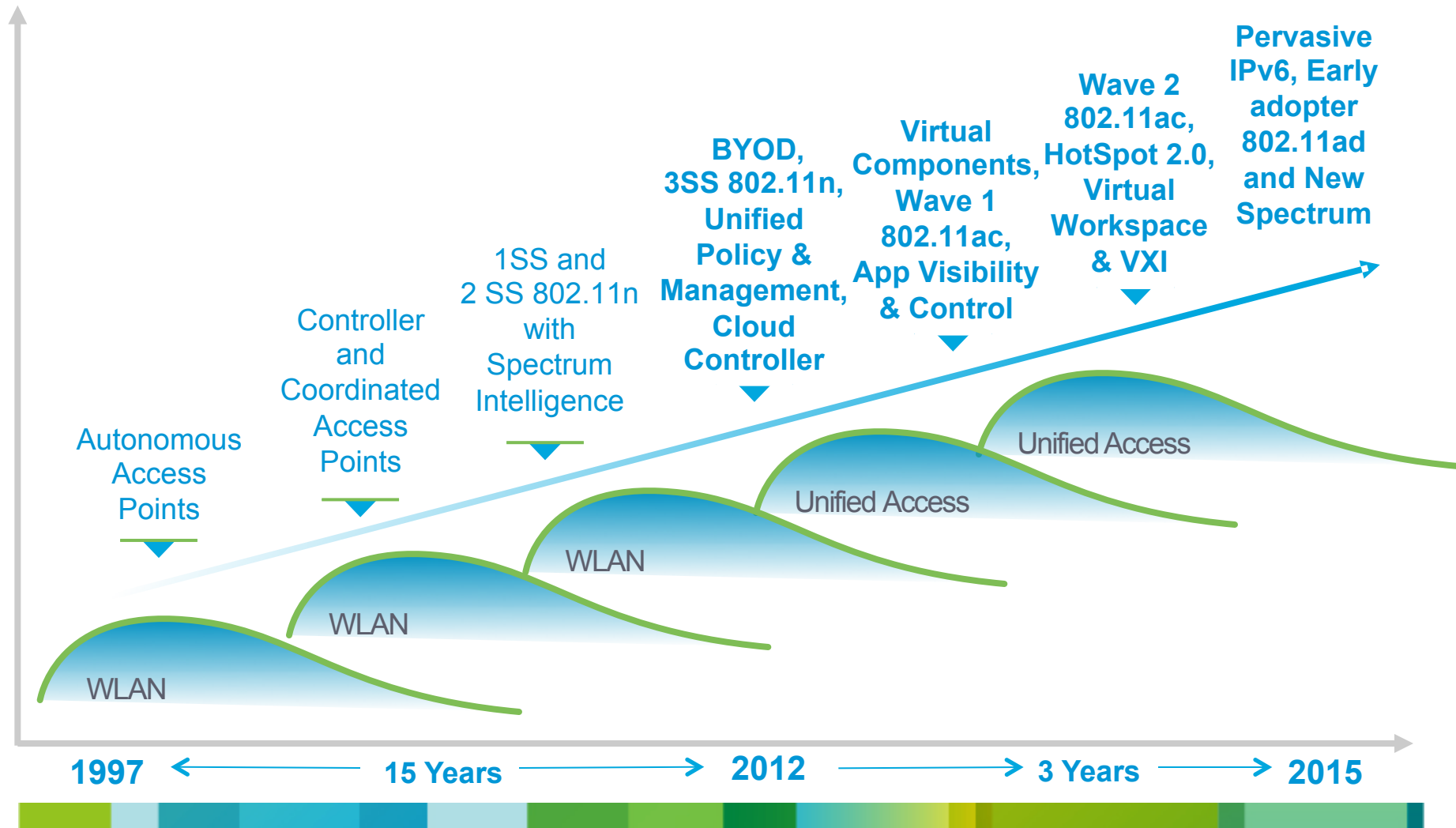
ANYTIME



ANY DEVICE



Unified Access Trends



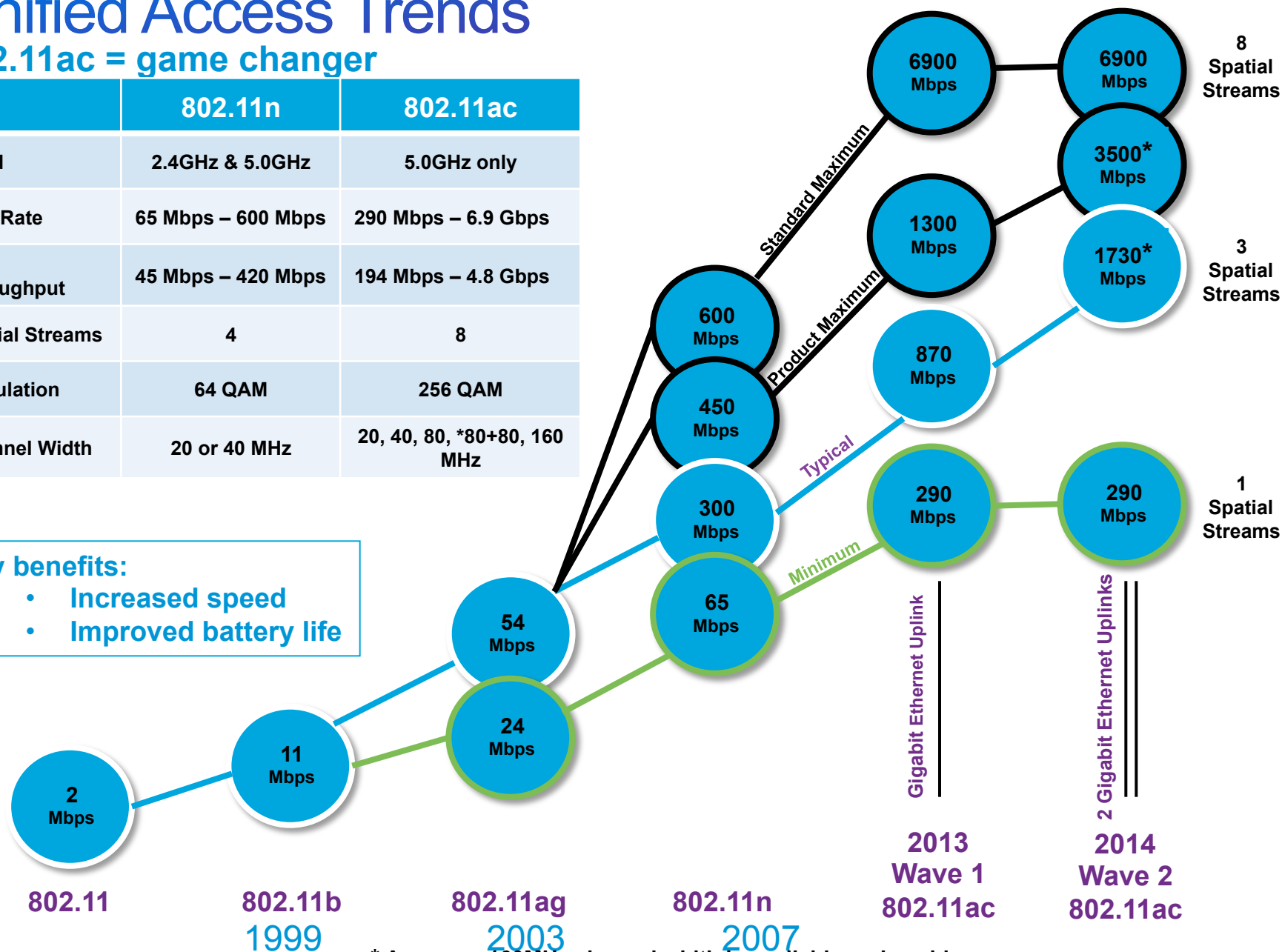
Unified Access Trends

802.11ac = game changer

	802.11n	802.11ac
Band	2.4GHz & 5.0GHz	5.0GHz only
PHY Rate	65 Mbps – 600 Mbps	290 Mbps – 6.9 Gbps
MAC Throughput	45 Mbps – 420 Mbps	194 Mbps – 4.8 Gbps
Spatial Streams	4	8
Modulation	64 QAM	256 QAM
Channel Width	20 or 40 MHz	20, 40, 80, *80+80, 160 MHz

Key benefits:

- Increased speed
- Improved battery life



* Assumes 160MHz channel width is available and usable

WiFi the New Access Layer

Connections and Expansion



Wireless

Wi-Fi

802.11ac Wi-Fi wireless networking;³ IEEE 802.11a/b/g/n compatible



Bluetooth

Bluetooth 4.0 wireless technology



802.11ac change paradigms... 1 Gbps over the air!!!!

WiFi the New Access Layer

BW (MHz)	# Spatial Streams	MCS (QAMr5/6)	PHY Rate (Mbps)	MAC Thru-put (Mbps)*
80	1	64	290	175
80	1	64	330	200
80	1	256	430	260
80	2	64	650	390
80	2	256	870	520
80	3	64	980	590
80	3	256	1300	780
80	4	256	1700	1020
80	8	256	3500	2100

1x1



Smartphones from 260 Mbps*

2x2



Tablets from 520 Mbps*

2x2
3x3



High End Laptops from 780 Mbps*

BYOD
CONNECTIONS

The Horizon Report 2013:

Tablets are proving to be powerful tools for learning inside and outside of the classroom.

* Assumes 60% MAC efficiency and 256 QAM connection with the AP

Not all Clients will be created equal – early chip drops and quality of components make a difference - mileage will vary
Rate & Range, Environment and Deployment will impact coverage and quality

802.11ac supported devices



IEEE 802.11ac Adapter



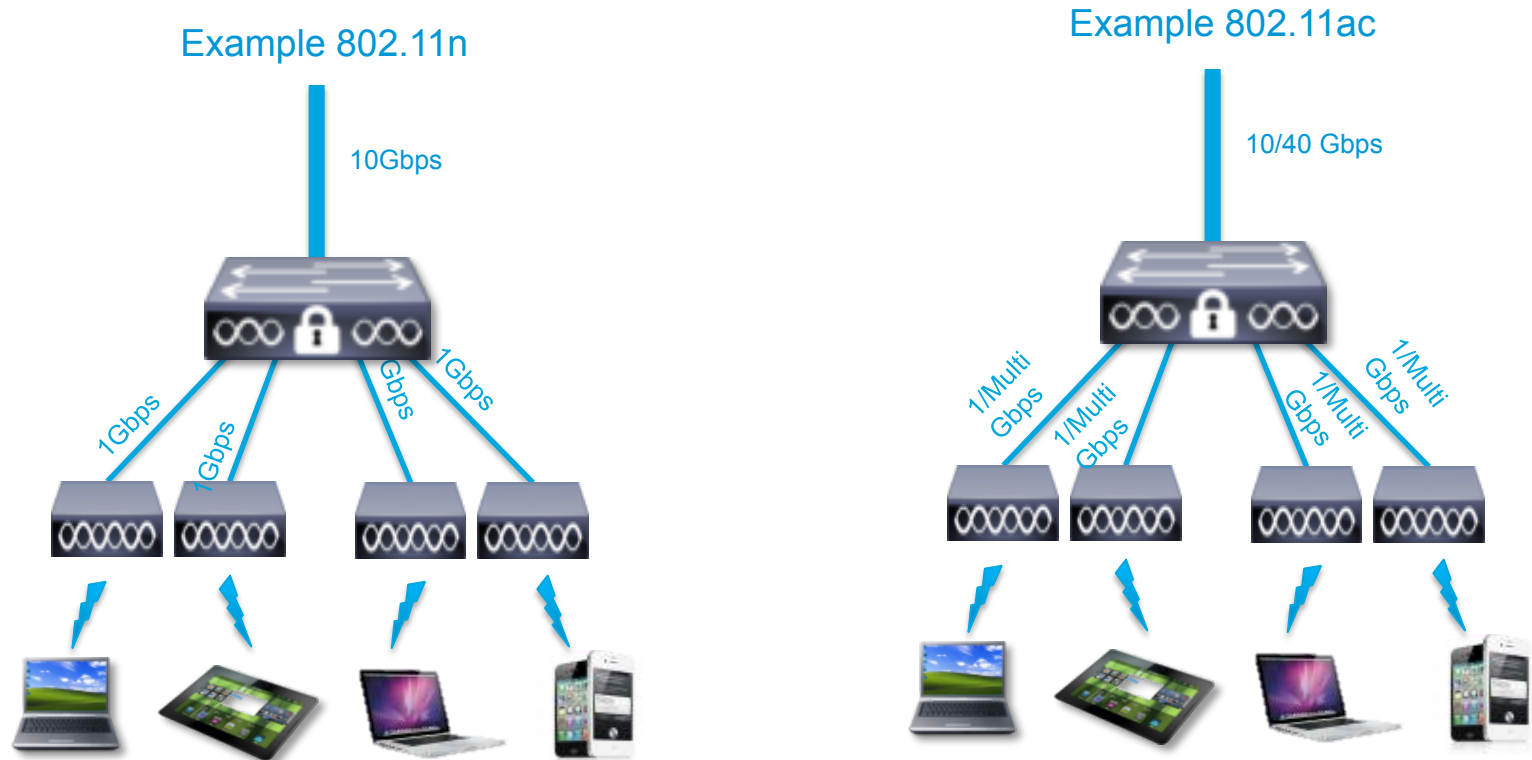
- vr-zone.com
- 2T2R (5GHz) + 2T2R (2.4GHz)
 - 900Mbps (11ac) + 300Mbps (2.4G)

http://wikidevi.com/wiki/List_of_802.11ac_Hardware

Today, the Network is more than Pipes



Premise: every WLAN design must be planned with 802.11ac & ad technologies



Campus Deployment Models

Unified Access

One
Management



Cisco Prime
Infrastructure

Cisco ISE

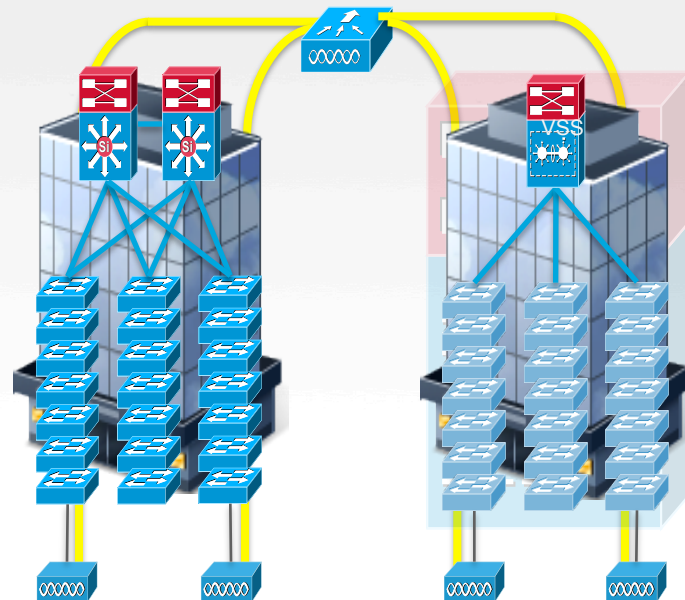


One Policy

Centralized Wireless

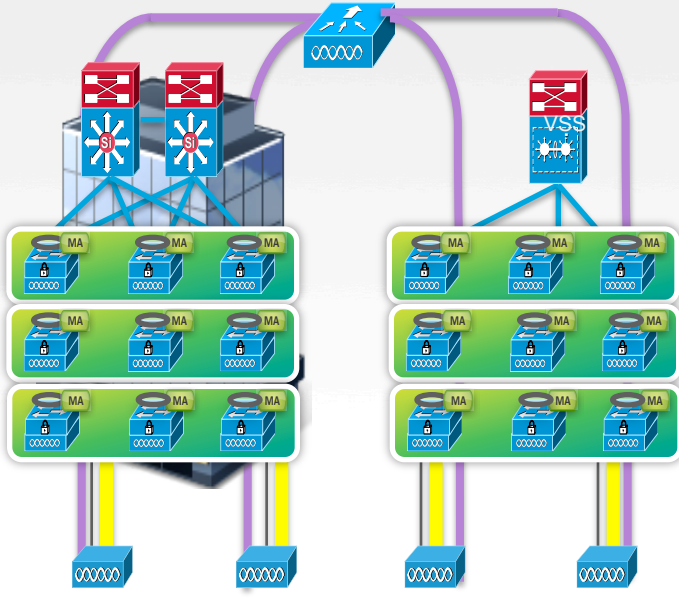
Distributed Wireless

Distributed Wired



Centralized Wired → IA

Distributed Wired



Centralized Wired → VSS

**Traditional
Access**

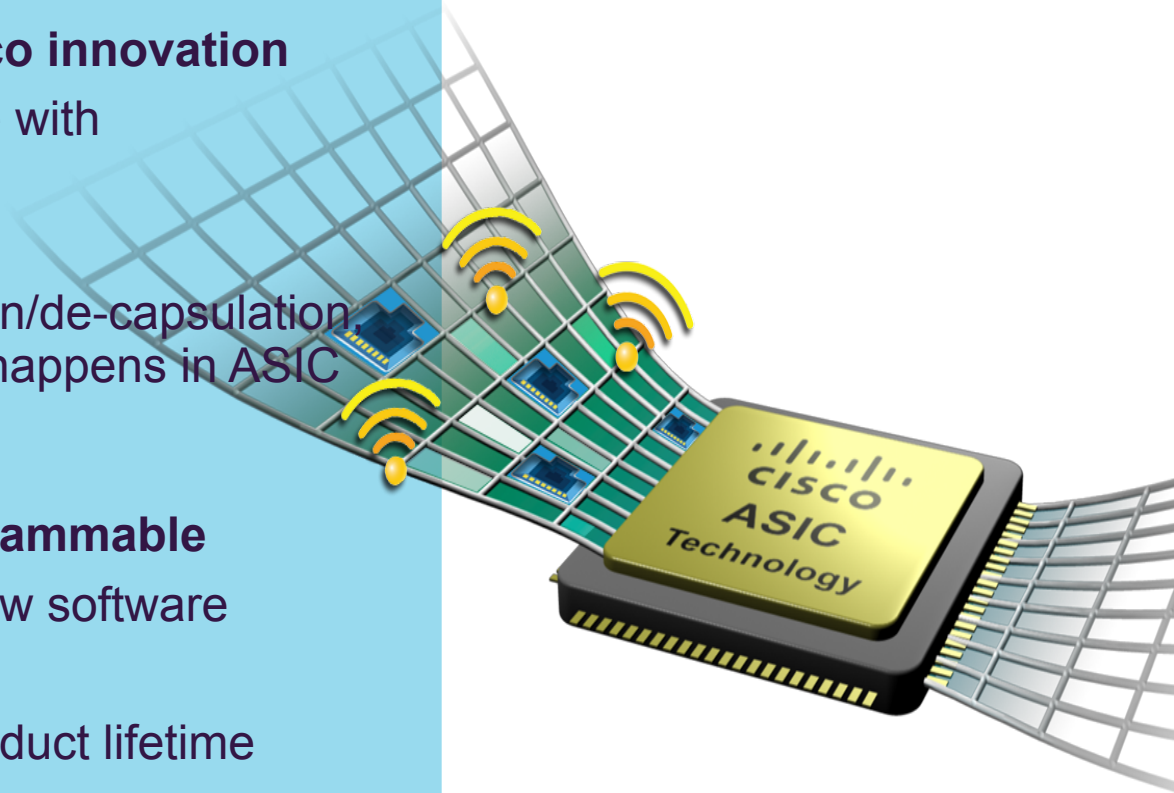
**Instant
Access**

Converged Access

UADP ASIC Enables Convergence

Built on UADP

- **Unified Access Data Plane**
- **Unique and powerful Cisco innovation**
 - Hardware performance with software flexibility
- **Optimized Performance**
 - CAPWAP encapsulation/de-capsulation
 - Flexible Netflow, QoS happens in ASIC for line rate performance
- **Future Proofed and Programmable**
 - Flexparser enables new software features (like SDN) over the product lifetime
- **UADP is used across multiple platforms –**
Catalyst 3650, 3850, Sup 8E, WLC5760



Using Cisco Higher Education Solution Portfolios



Teaching & Learning

Create collaborative experiences, improve learning outcomes, and support innovation and discovery of great scientific minds



Administration & Management

Maximize resources to invest in initiatives that advance knowledge while providing valuable service to the community



Safety & Security

Approach safety and security holistically to foster student trust in the campus environment and promote learning



Research & Knowledge

Leverage data center technologies, developer networks, and cloud offerings that expand the boundaries of research and knowledge

Thank you.



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