Next Generation Networks and IPv6 Opportunities

3com

John Hart
3Com Fellow

Retired
Senior Vice President &
Chief Technical Officer

Agenda

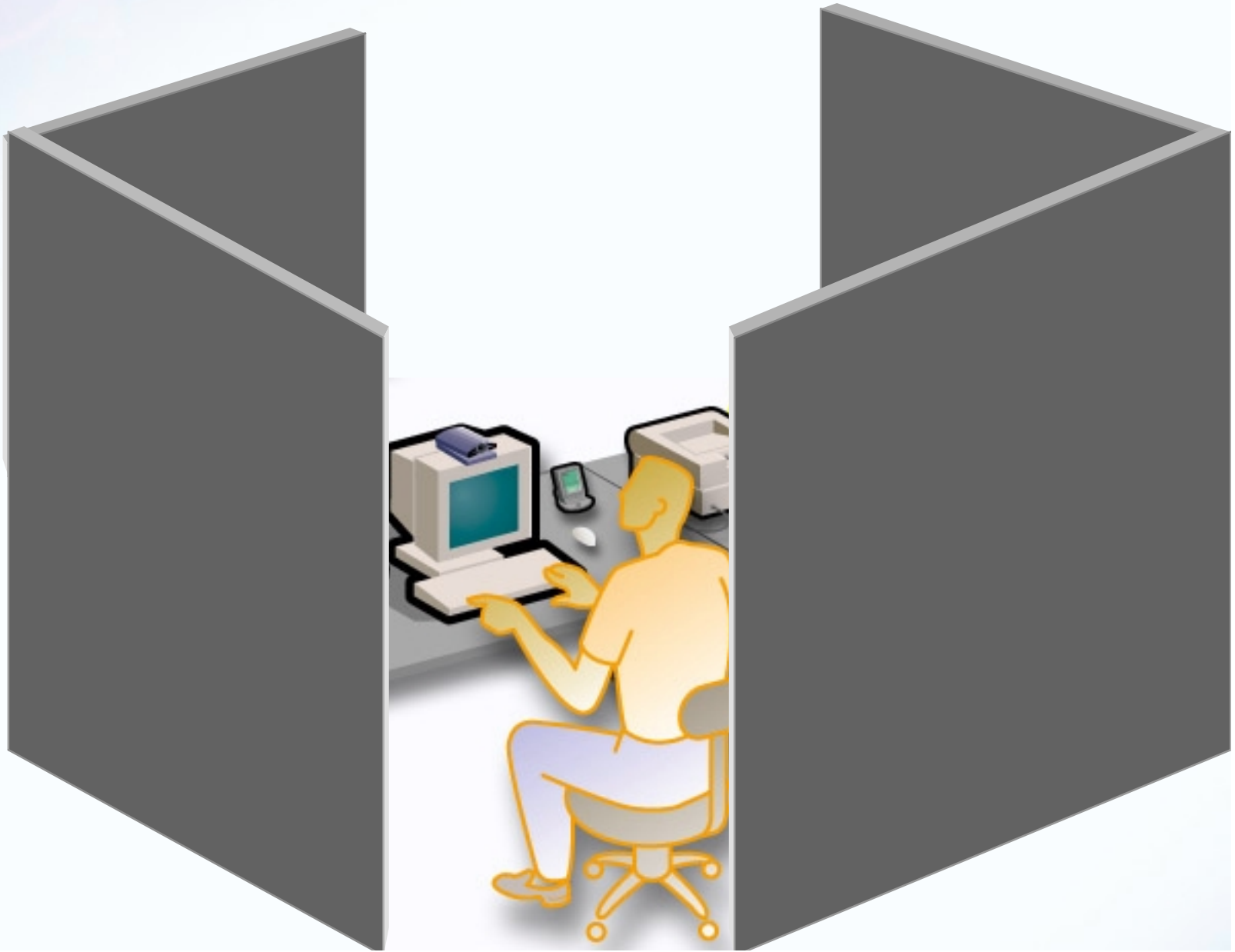
- Requirements of next generation Networks
- Resulting architecture and why
- IPv6 opportunities
- Conclusions

IPv6

Requirements at the edge

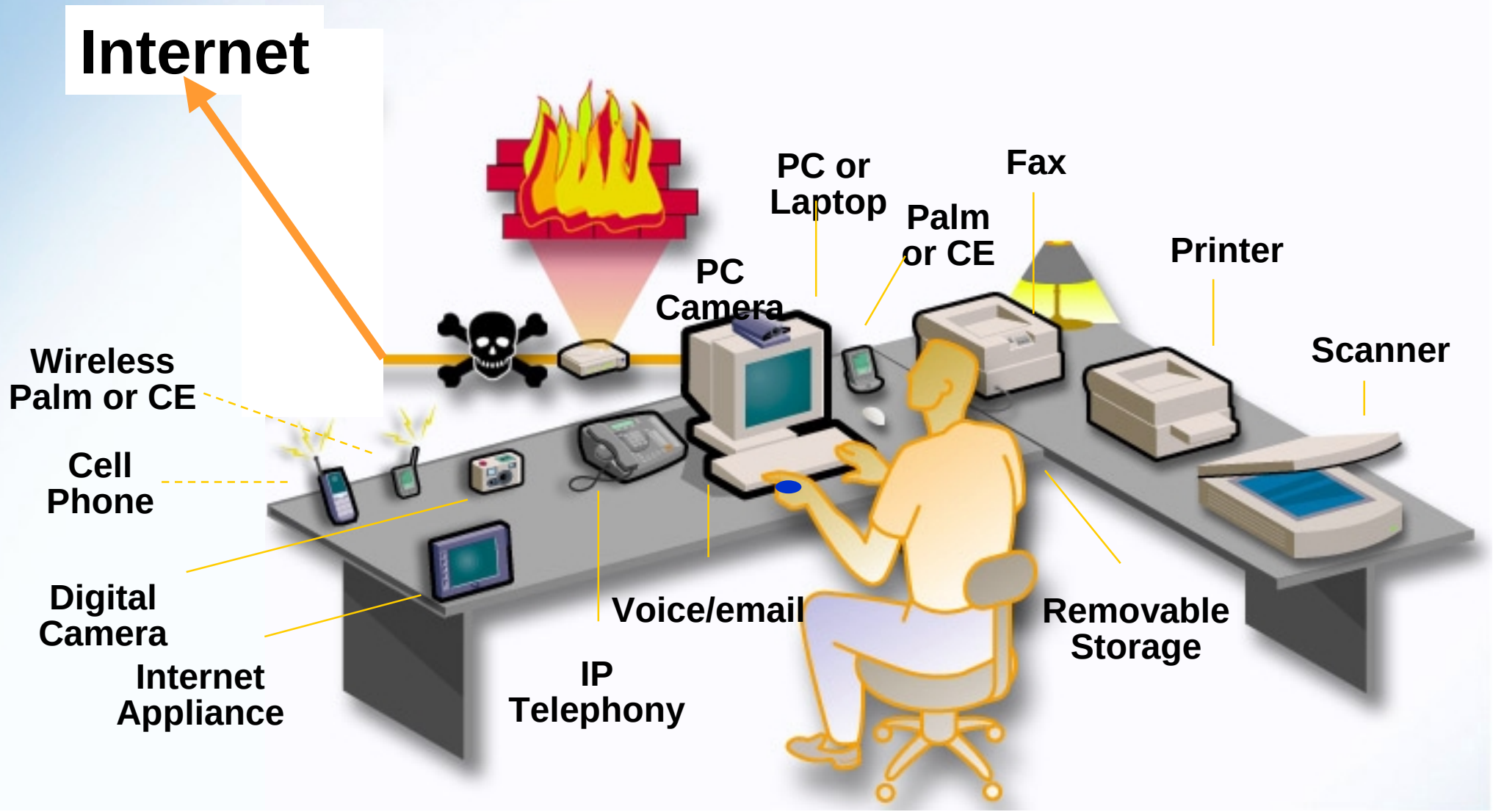
IPv6

Office Requirements:
from a networked PC



IPv6

Office Requirements:
to a networked cluster



IPv6

Travel Requirements:
from remote dial access

Office Buildings

Apartments & Condos

Hotels

IPv6

Travel Requirements:
to Visitor Based Networking

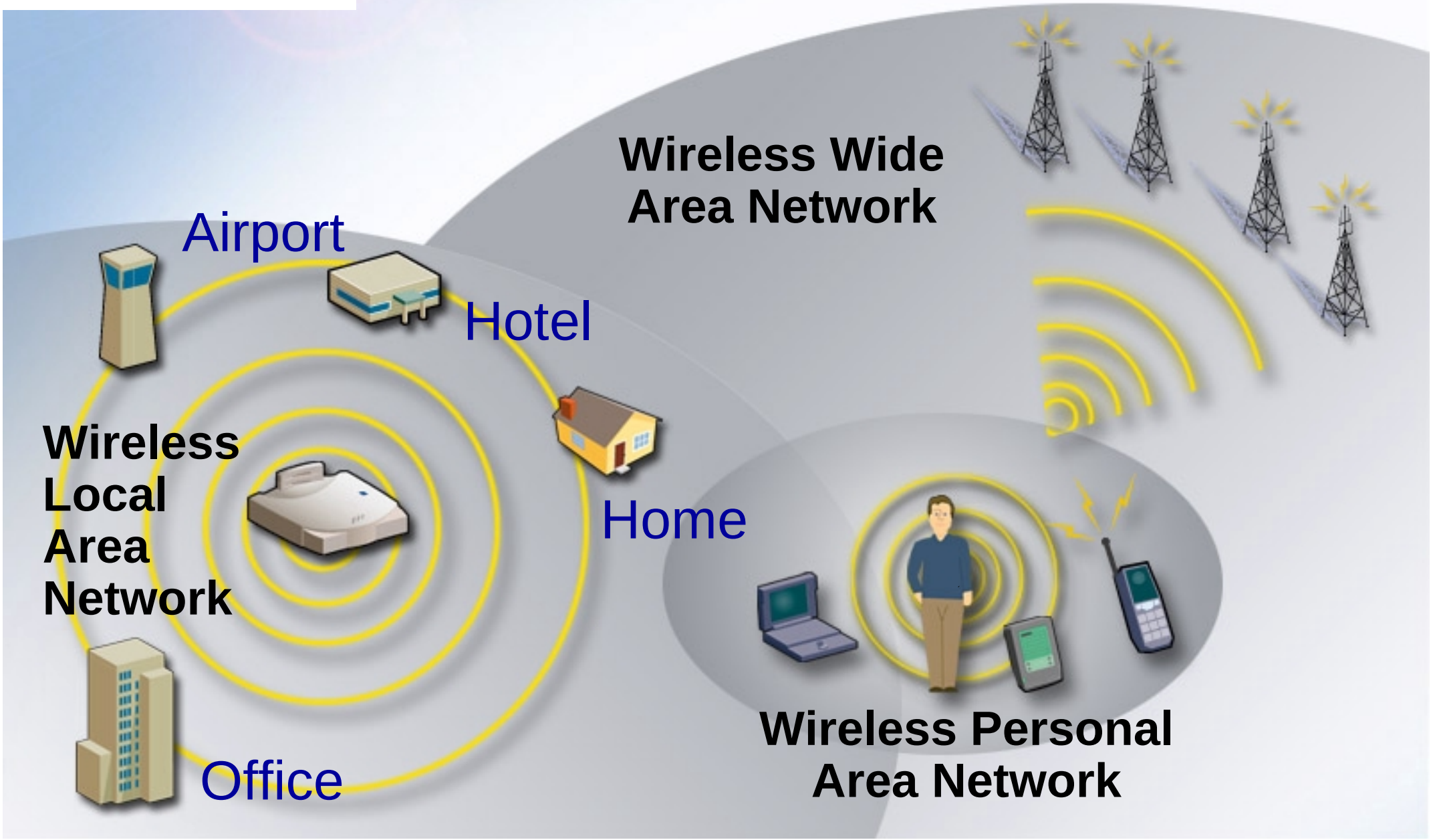
Office Buildings

Apartments & Condos

Hotels

IPv6

From transportable to continuous mobile connectivity

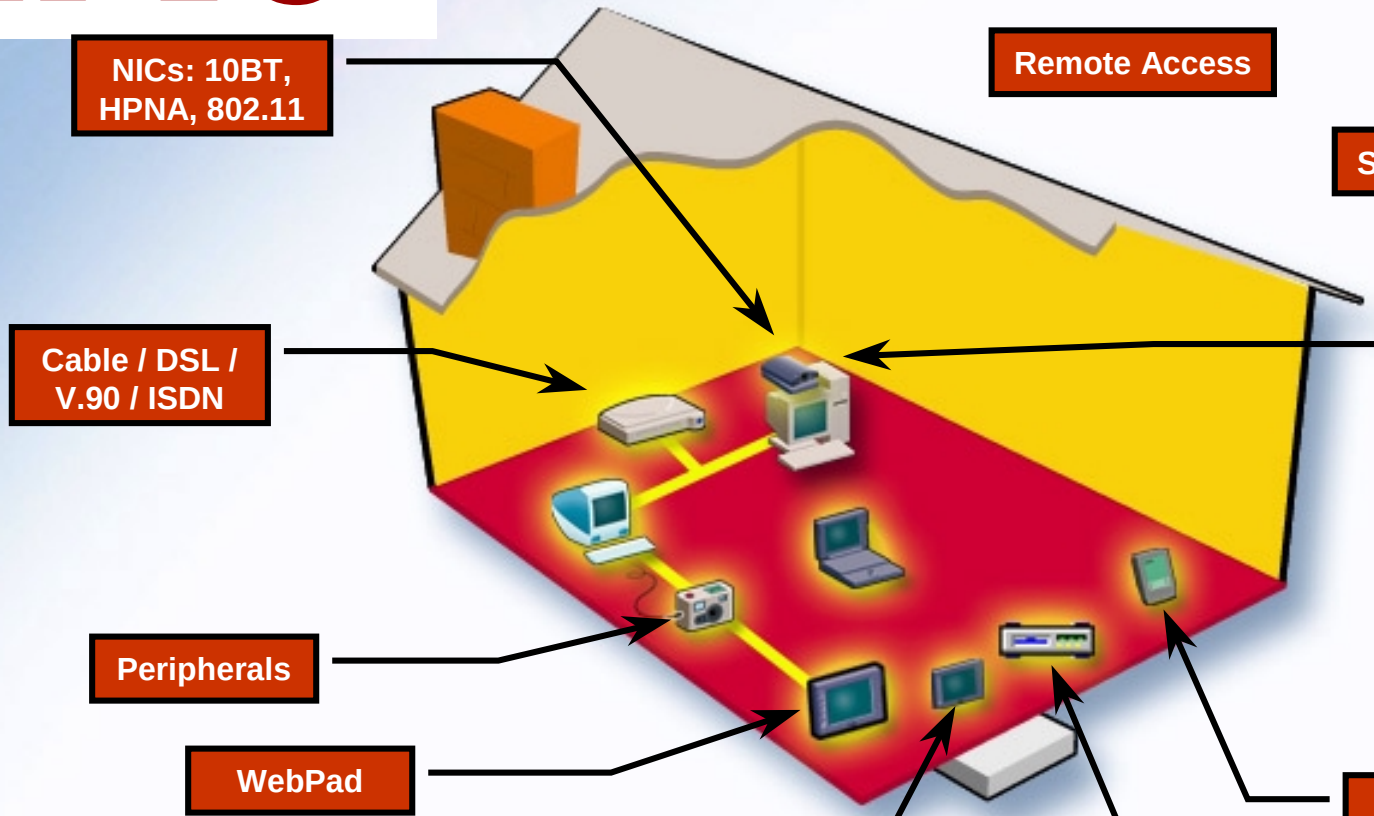


IPv6

Home requirements:
from remote PC access

IPv6

Home requirements:
to “data” requirements



NICs: 10BT, HPNA, 802.11

Remote Access

Speech Recognition

Cable / DSL / V.90 / ISDN

PC Video

Universal Messaging

Peripherals

Firewall / Security

WebPad

PDA

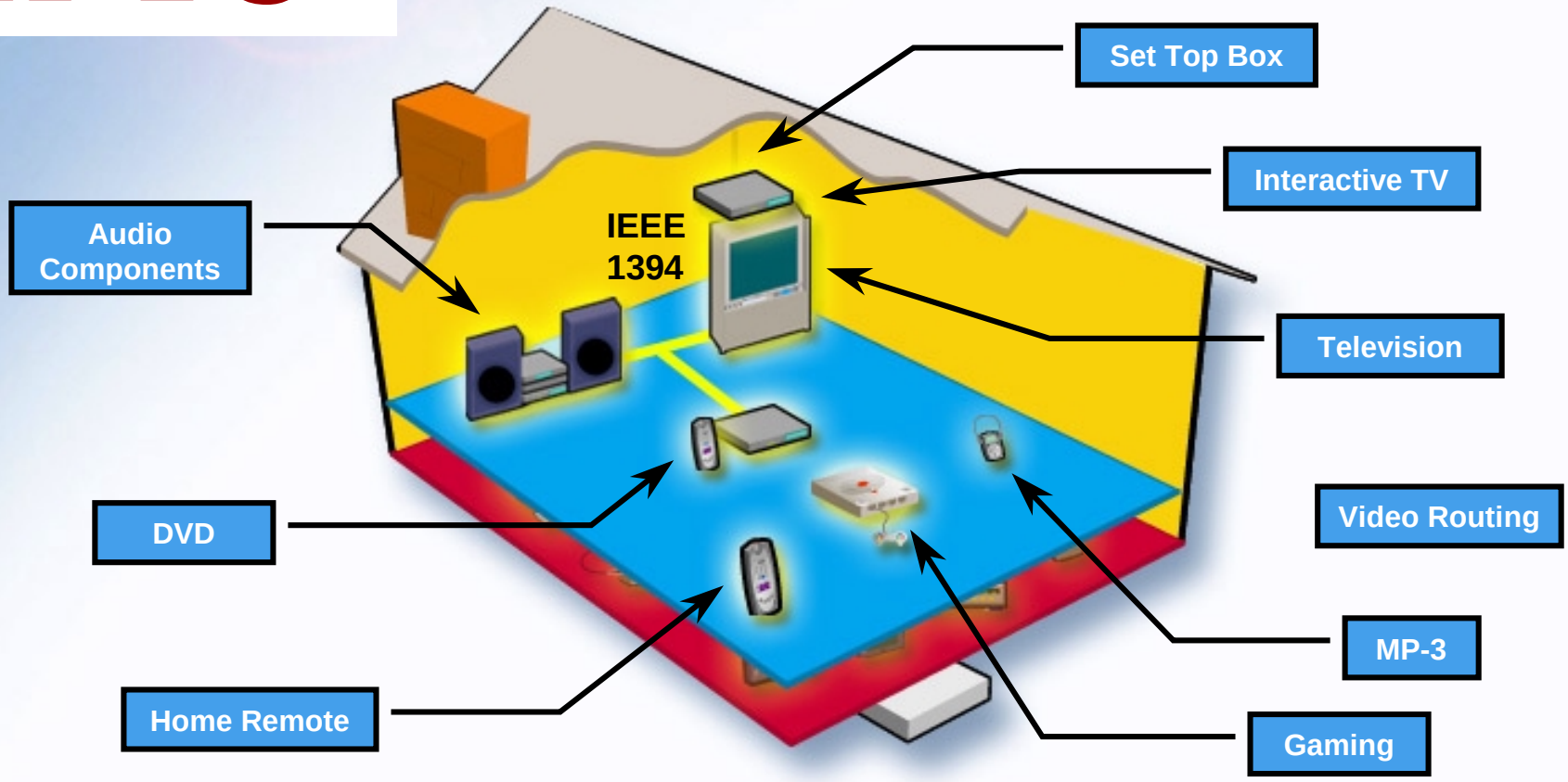
Countertop IA

Internet Radio IA

HPNA, 10Base-T, 802.11, PLC

IPv6

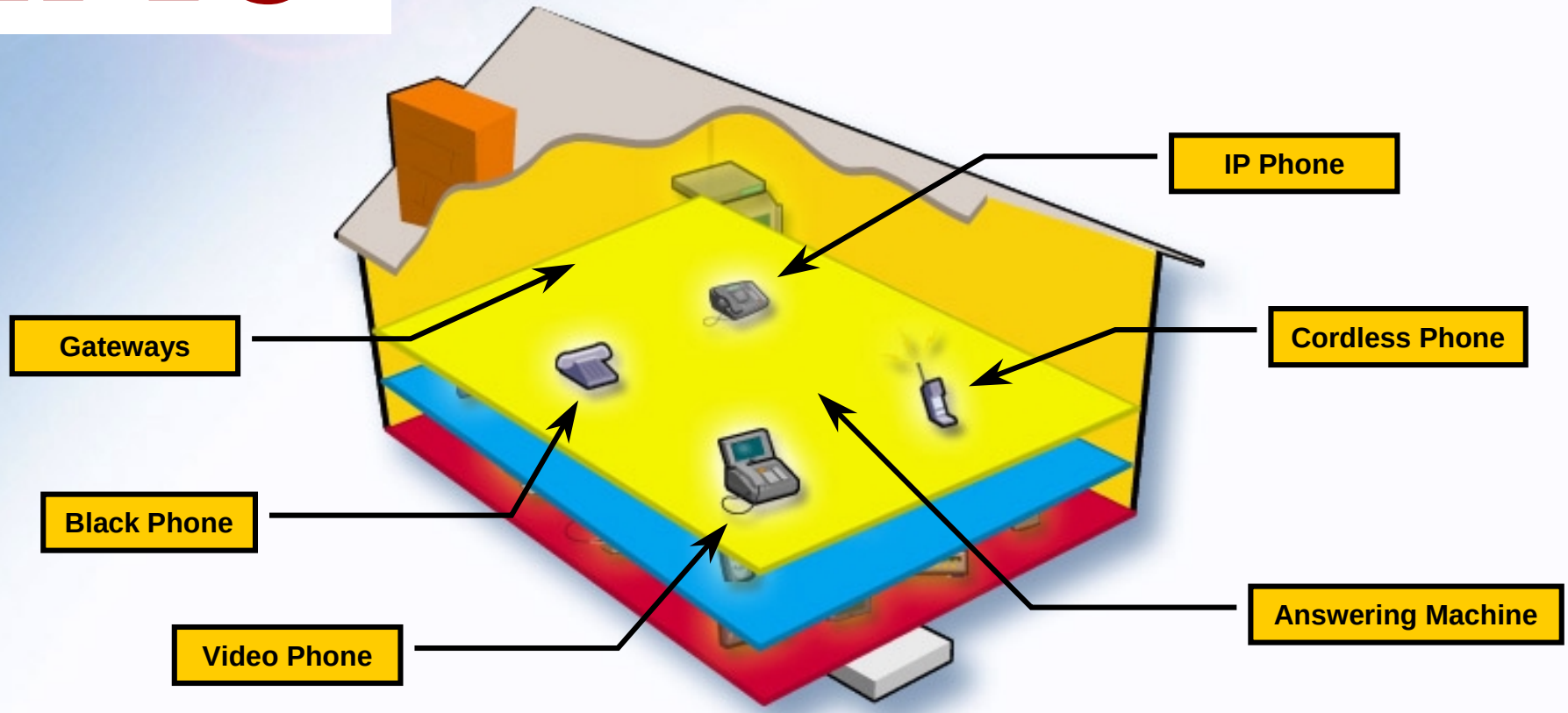
Home requirements:
to “entertainment” requirements



HPNA, 10Base-T, 802.11, PLC	IEEE 1394, IrDA, MediaWire

IPv6

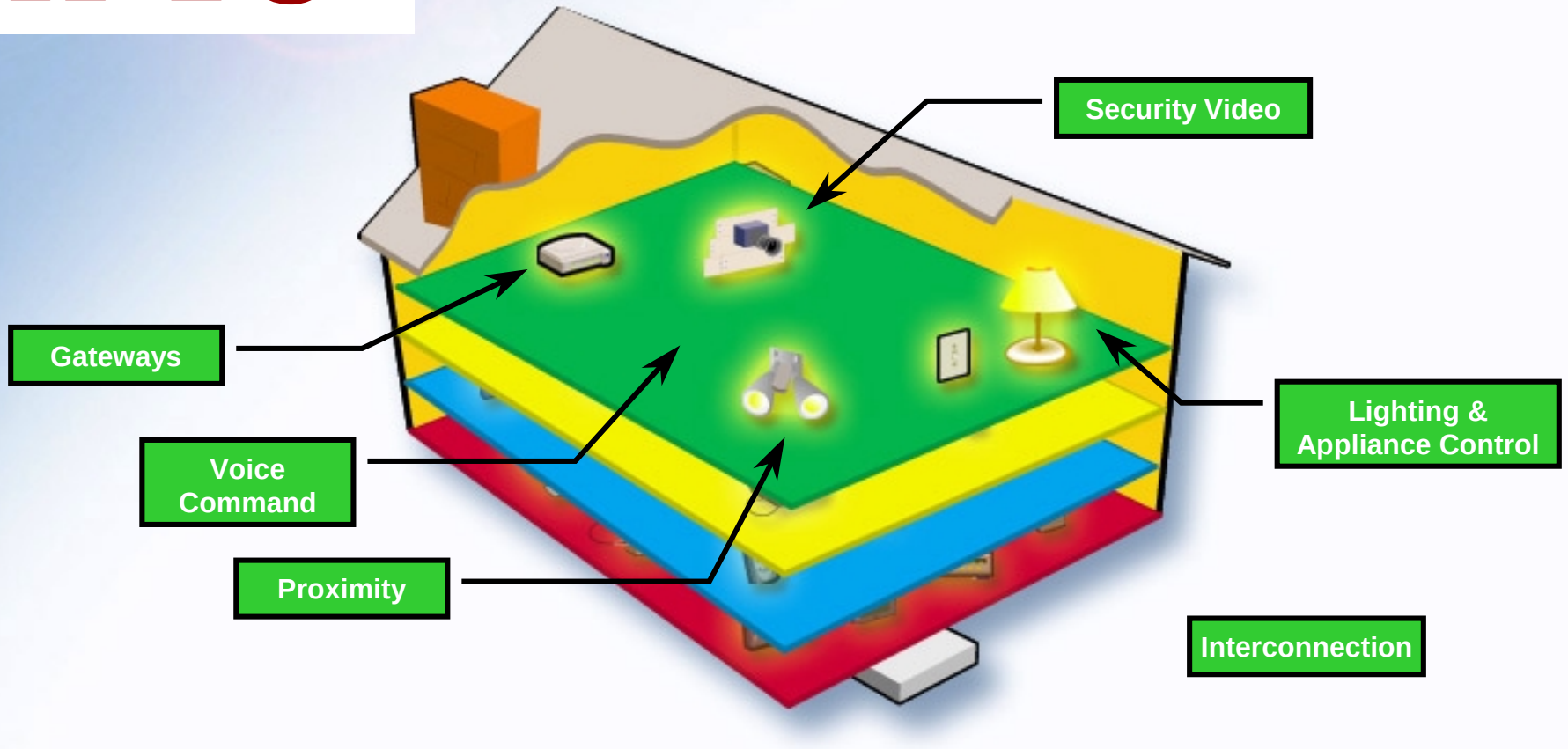
Home requirements:
to “telephony” requirements



HPNA, 10Base-T, 802.11, PLC	IEEE 1394, IrDA, MediaWire	POTs, HPNA, 10Base-T, DECT

IPv6

Home requirements:
to “automation” requirements



HPNA, 10Base-T, 802.11, PLC	IEEE 1394, IrDA, MediaWire	POTs, HPNA, 10Base-T, DECT	X-10, LON

IPv6

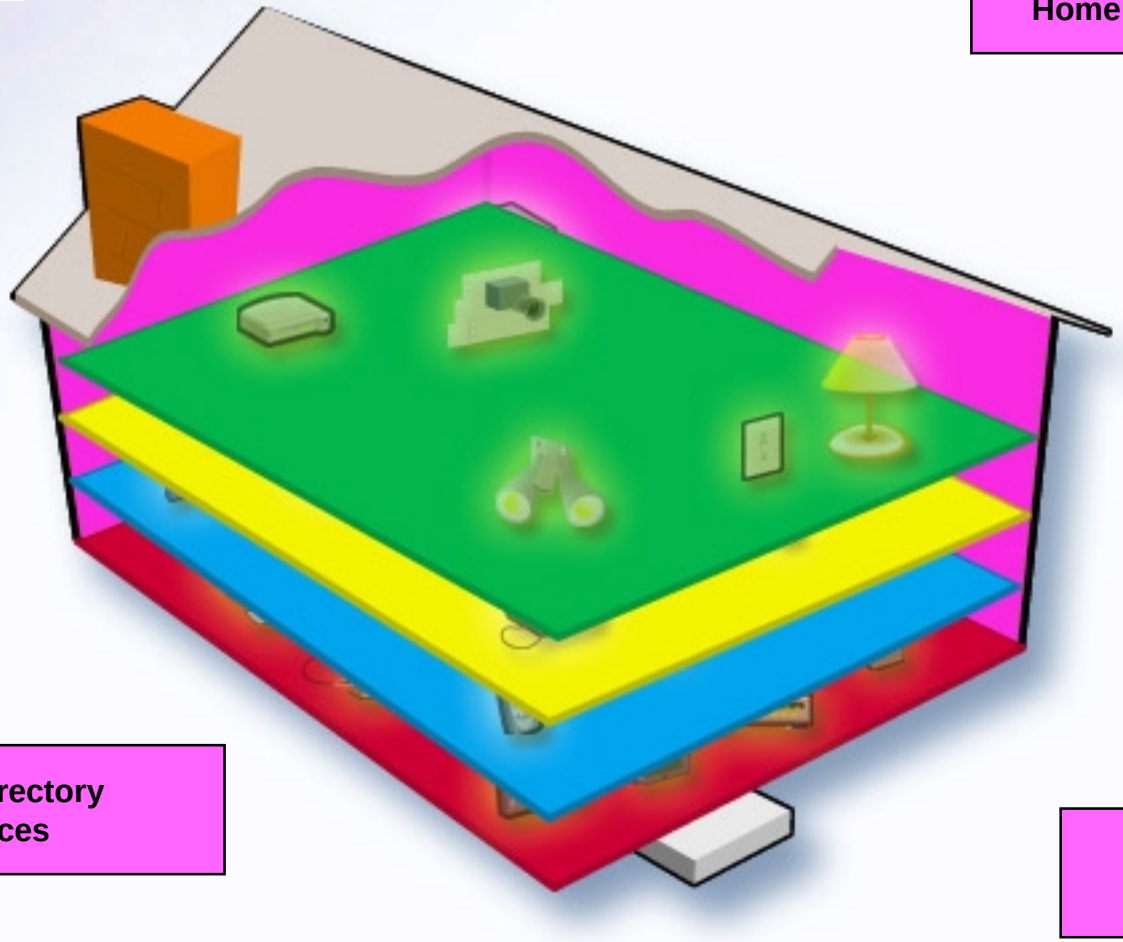
Home requirements:
to “network” requirements

Unified Messaging

Home Administration

Discovery & Config.

Personal Agents



Device Mgt.

Universal Access

Universal QoS

Smart Directory Services

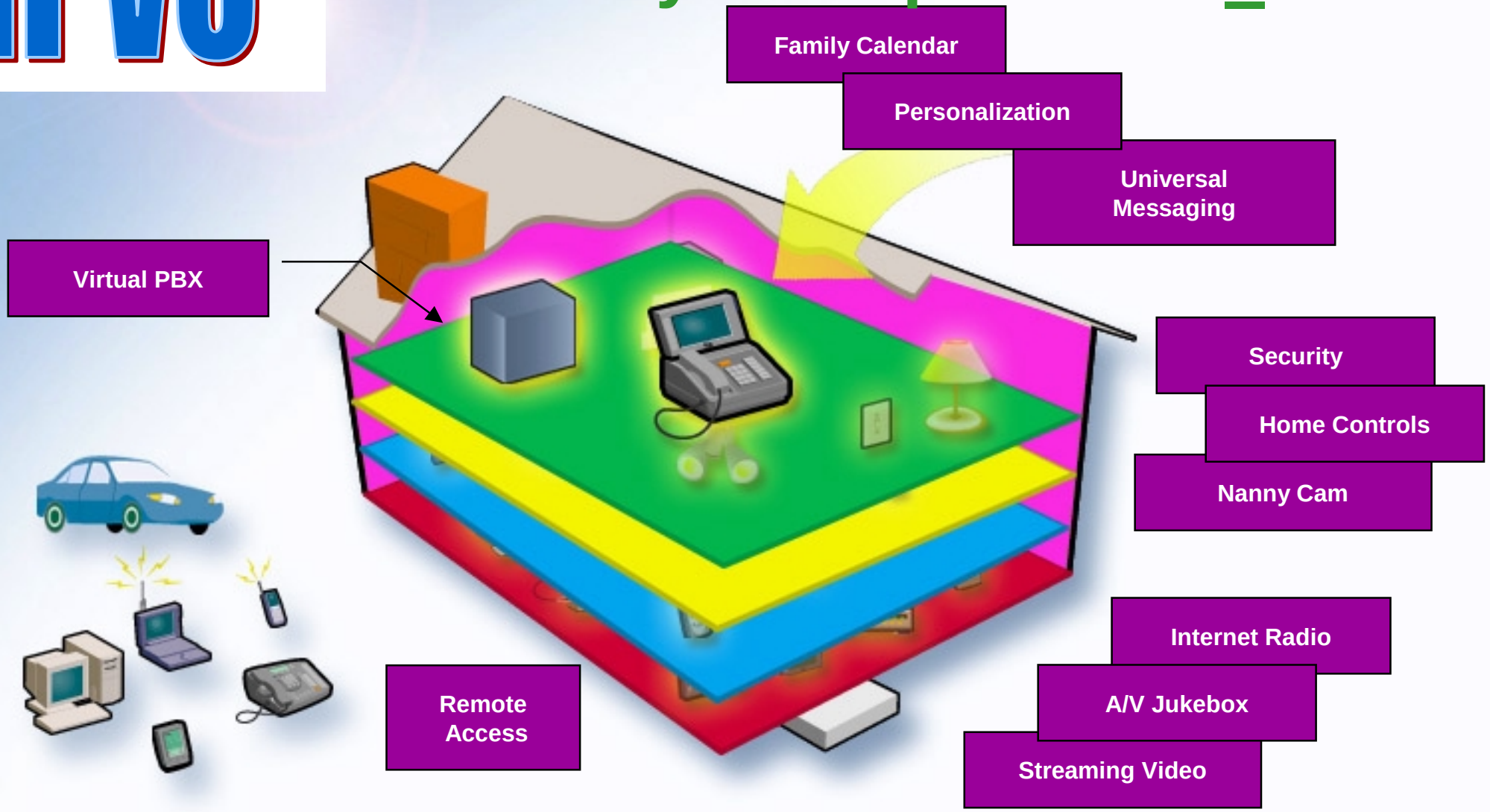
Content Redirection

Converged Applications and Services – Tying Together All The Pieces

HPNA, 10Base-T, 802.11, PLC	IEEE 1394, IrDA, MediaWire	POTs, HPNA, 10Base-T, DECT	X-10, LON

IPv6

Home requirements:
to "lifestyle" requirements



Converged Applications and Services – Tying Together All The Pieces

HPNA, 10Base-T, 802.11, PLC	IEEE 1394, IrDA, MediaWire	POTs, HPNA, 10Base-T, DECT	X-10, LON

Major Implications

Major Implications

As the network scales to support “billions” and “billions” of edge devices/users

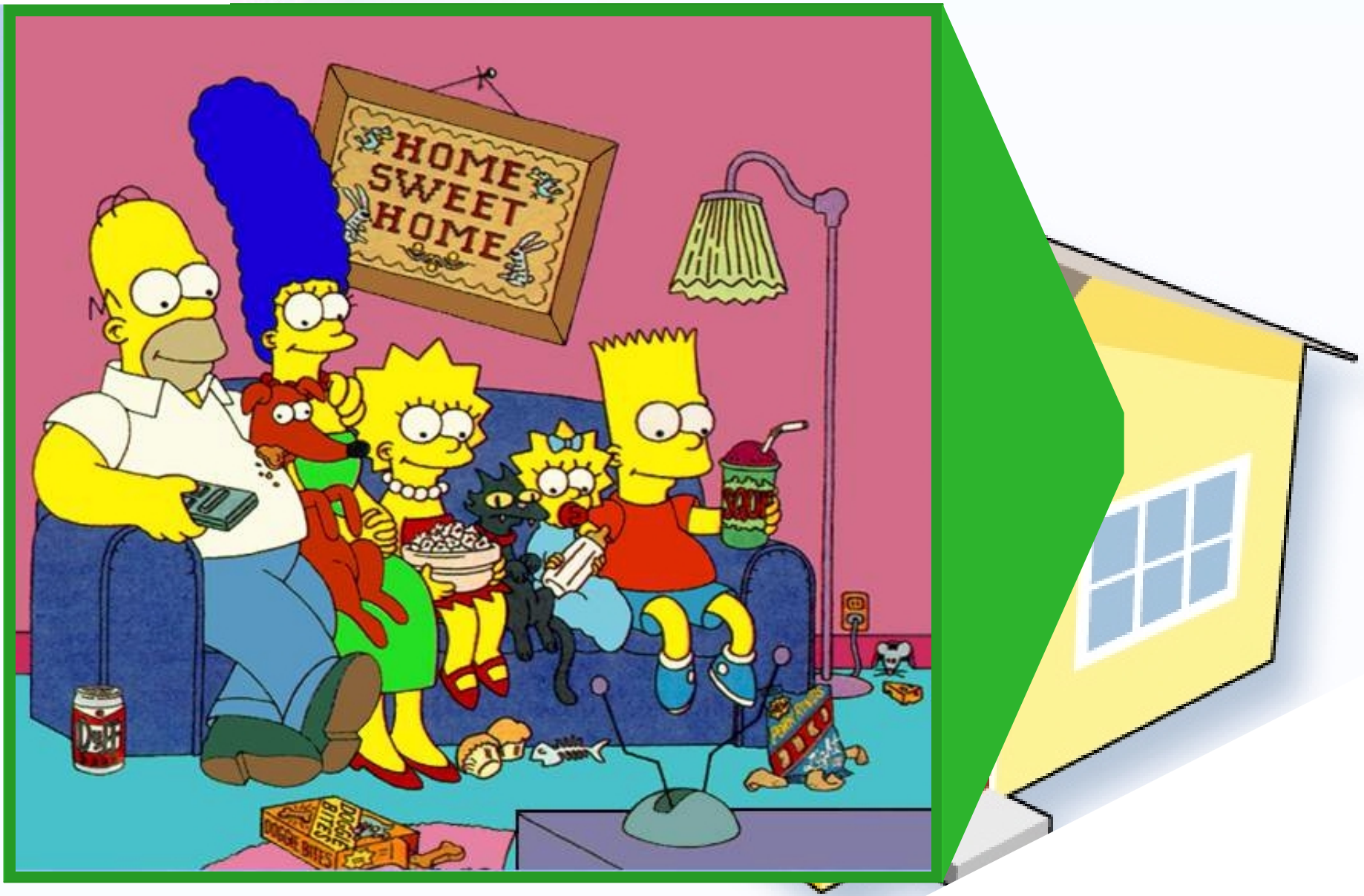
The core bandwidth requirements increase by an order of magnitude every 2 years

IPv6

Edge support requirements

IPv6

the Staff...



IPv6

the Staff… with their CIO

IPv6

Resulting high level trends and characteristics

Industry Trends

From isolated network deployment
to global Internet/web deployment

From plain connectivity
to rich connectivity

From wired access
to wired and wireless access

From general purpose devices
to general and special purpose devices

From large enterprises to
to large-to-small enterprises and consumer

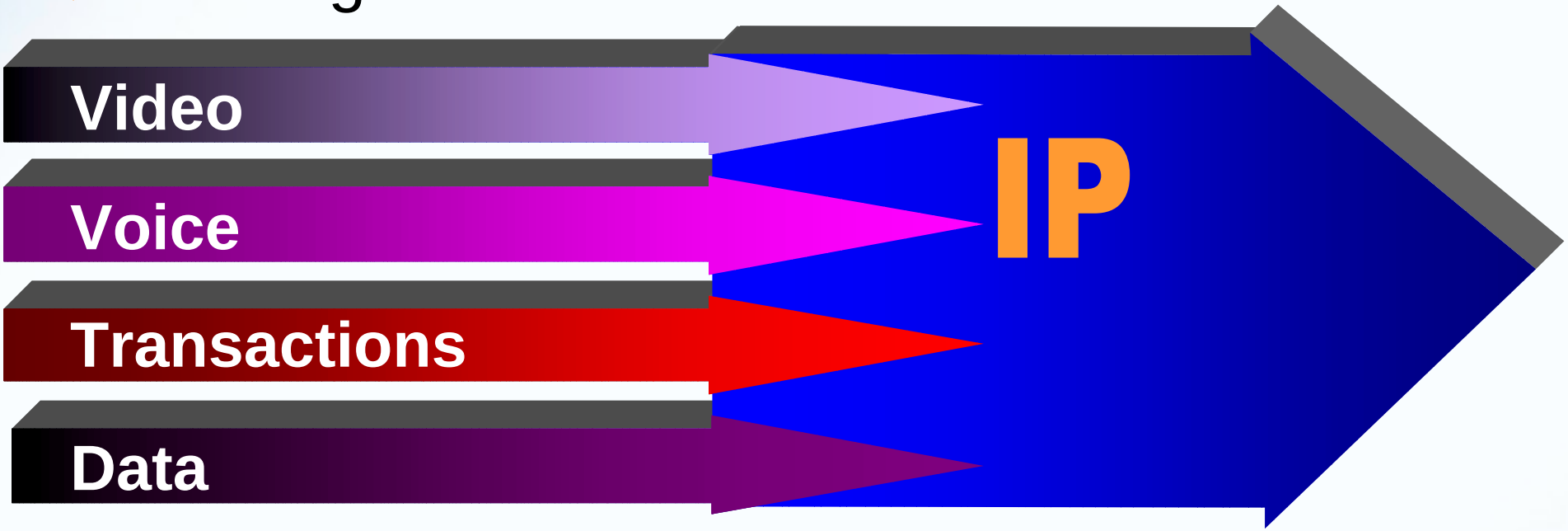
High level solution characteristics

- Converged

IPv6

High level solution characteristics

- Converged



High level solution characteristics

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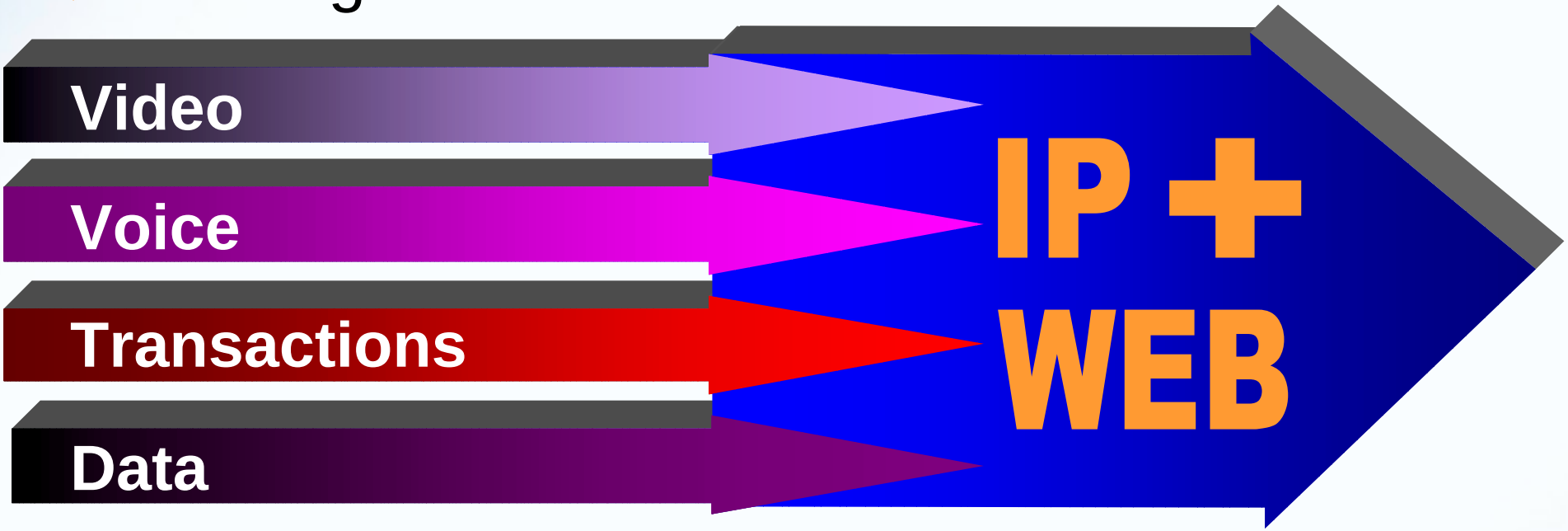
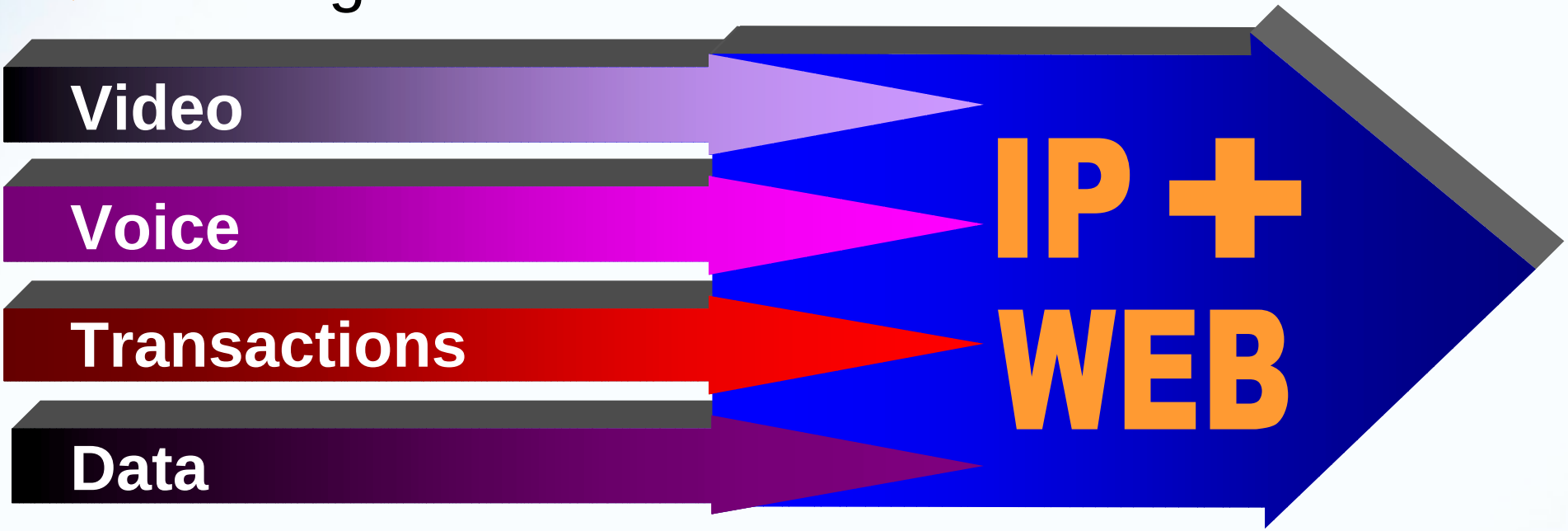


IPv6

High level solution characteristics

- Safe
- Seamless
- Automatic
- Anywhere
- Anytime
- Converged



IPv6

High level solution characteristics and benefits

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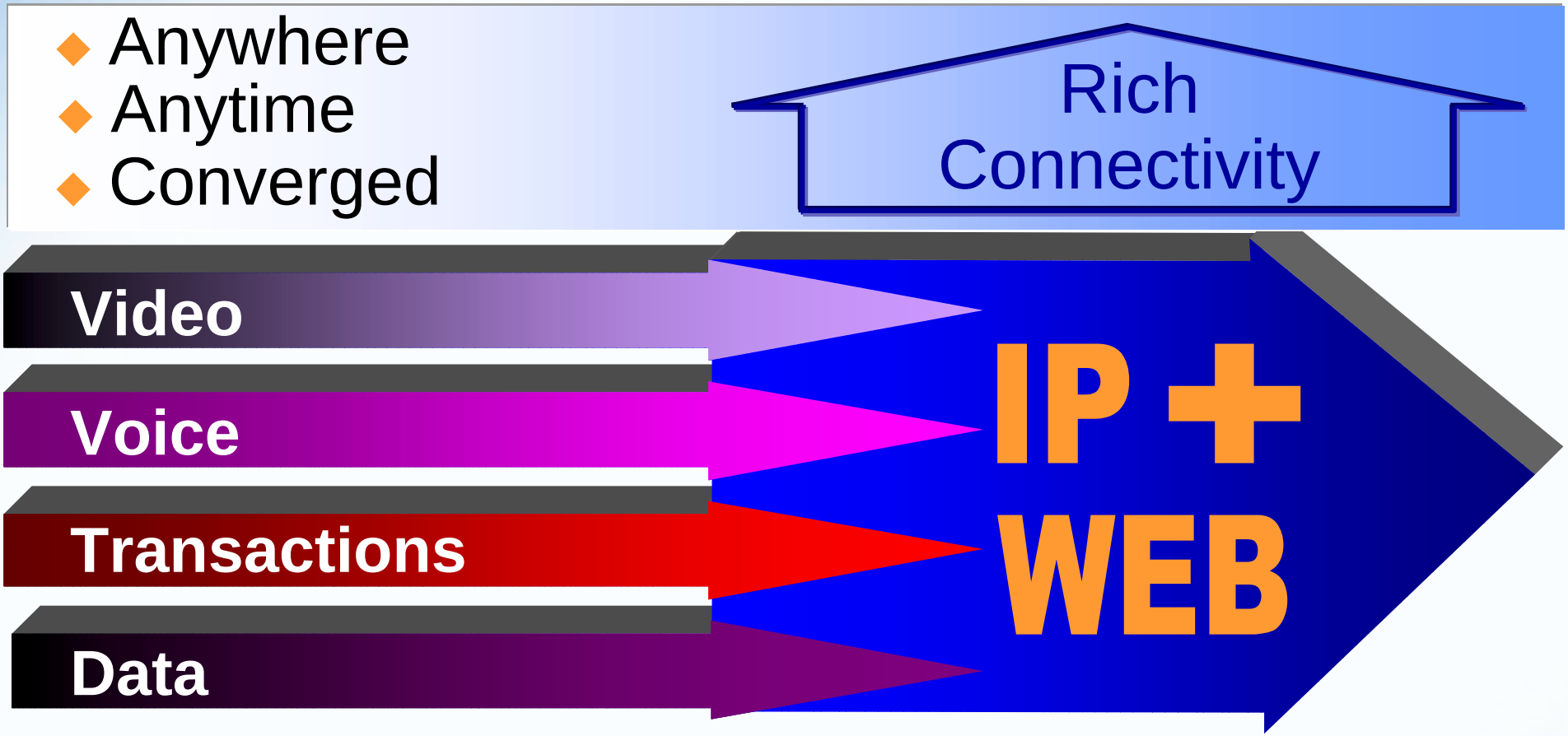


IPv6

High level solution characteristics and benefits

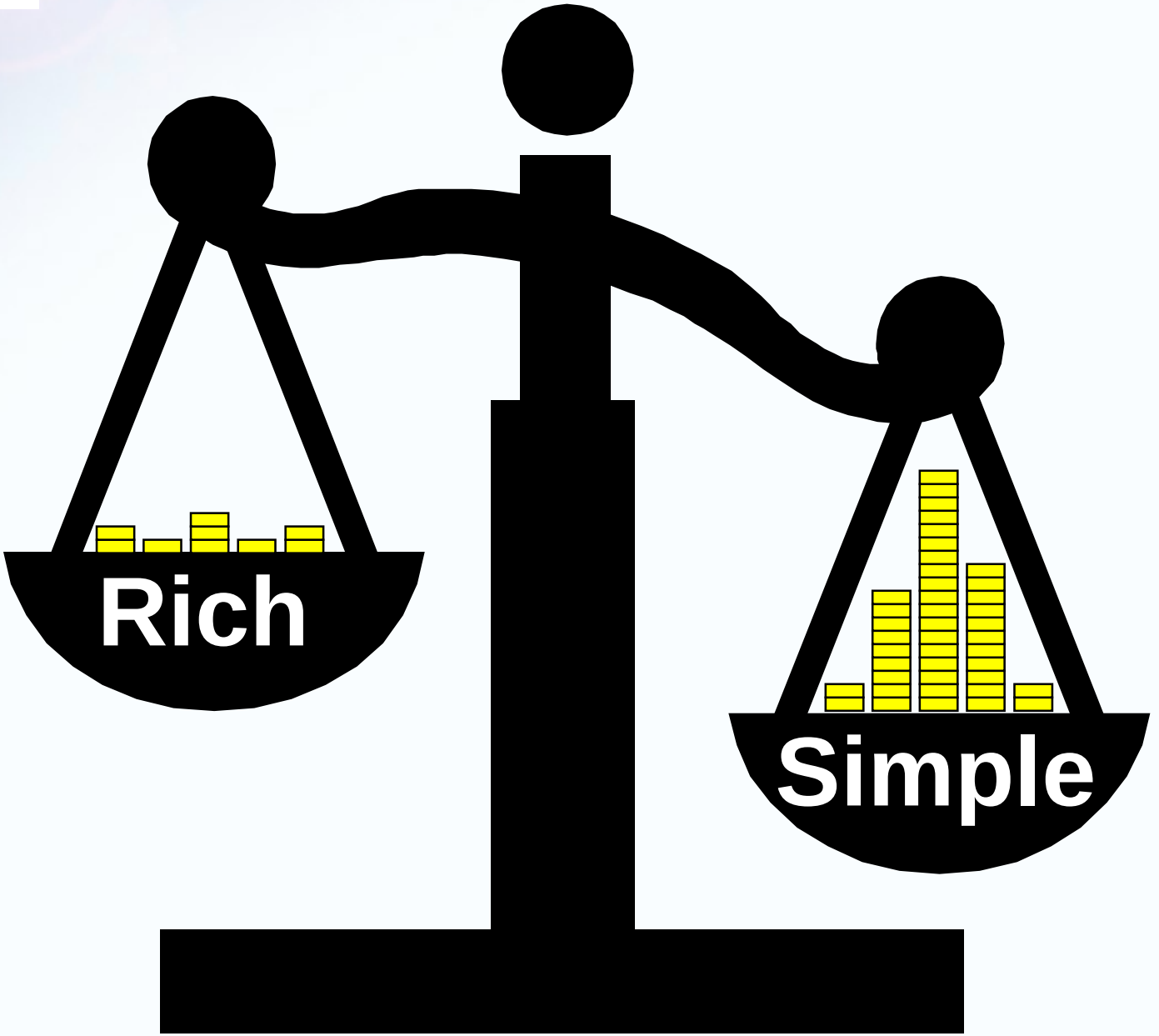
- Safe
- Seamless
- Automatic
- Anywhere
- Anytime
- Converged

Radical Simplicity

Rich Connectivity

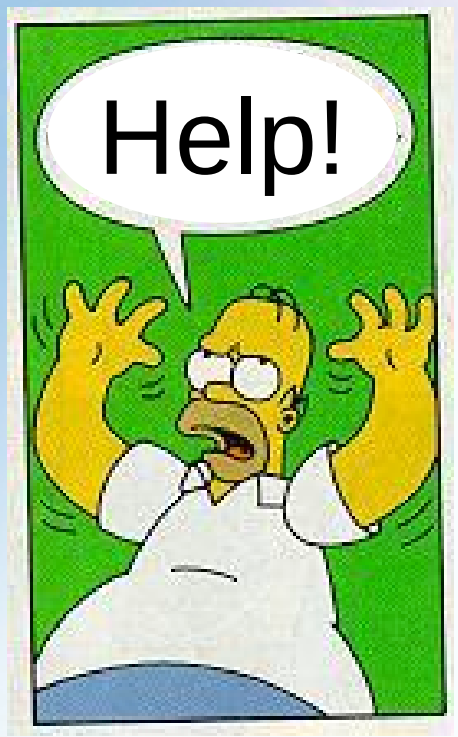
IPv6

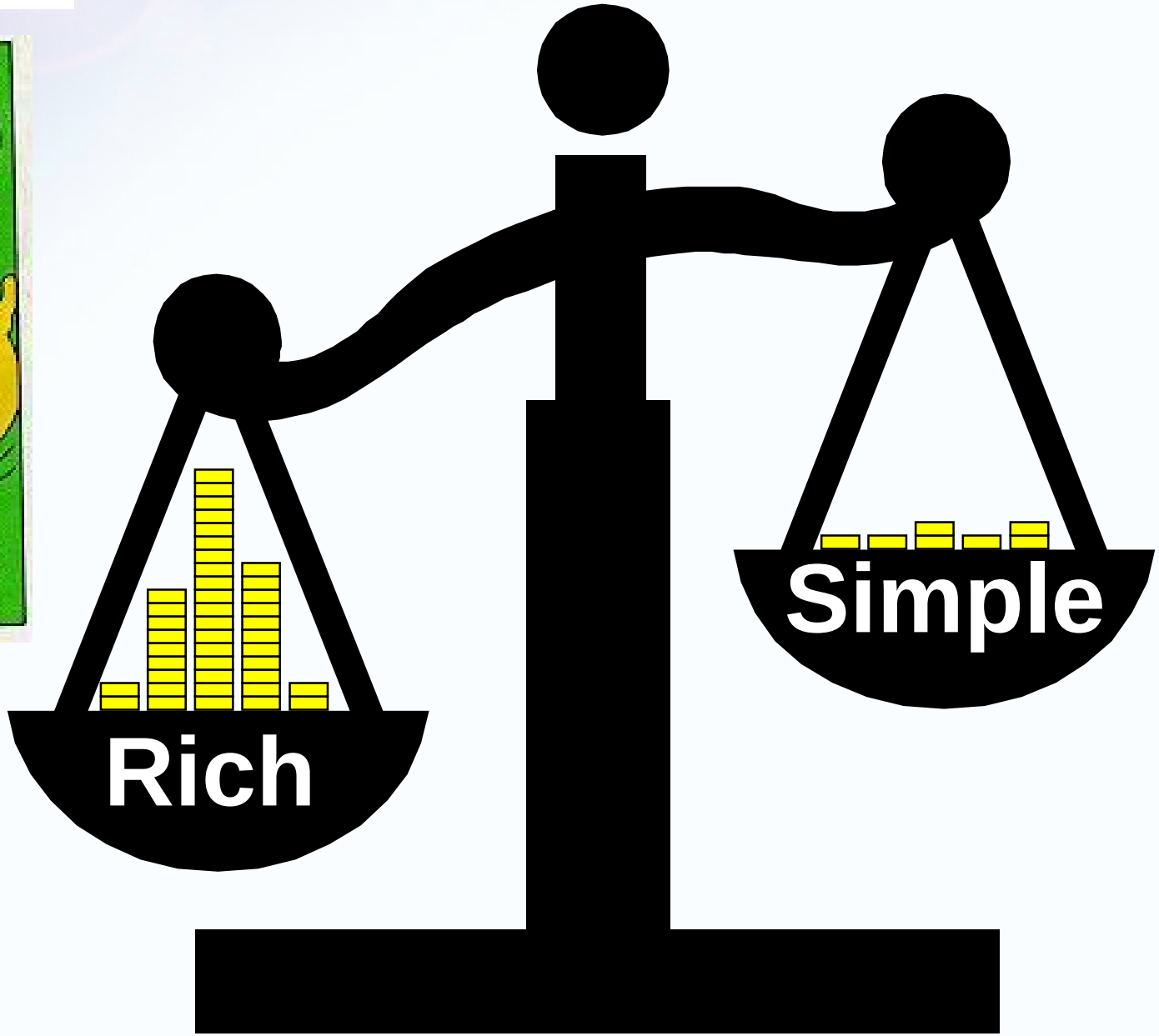
High level solution characteristics and benefits



IPv6

High level solution characteristics and benefits





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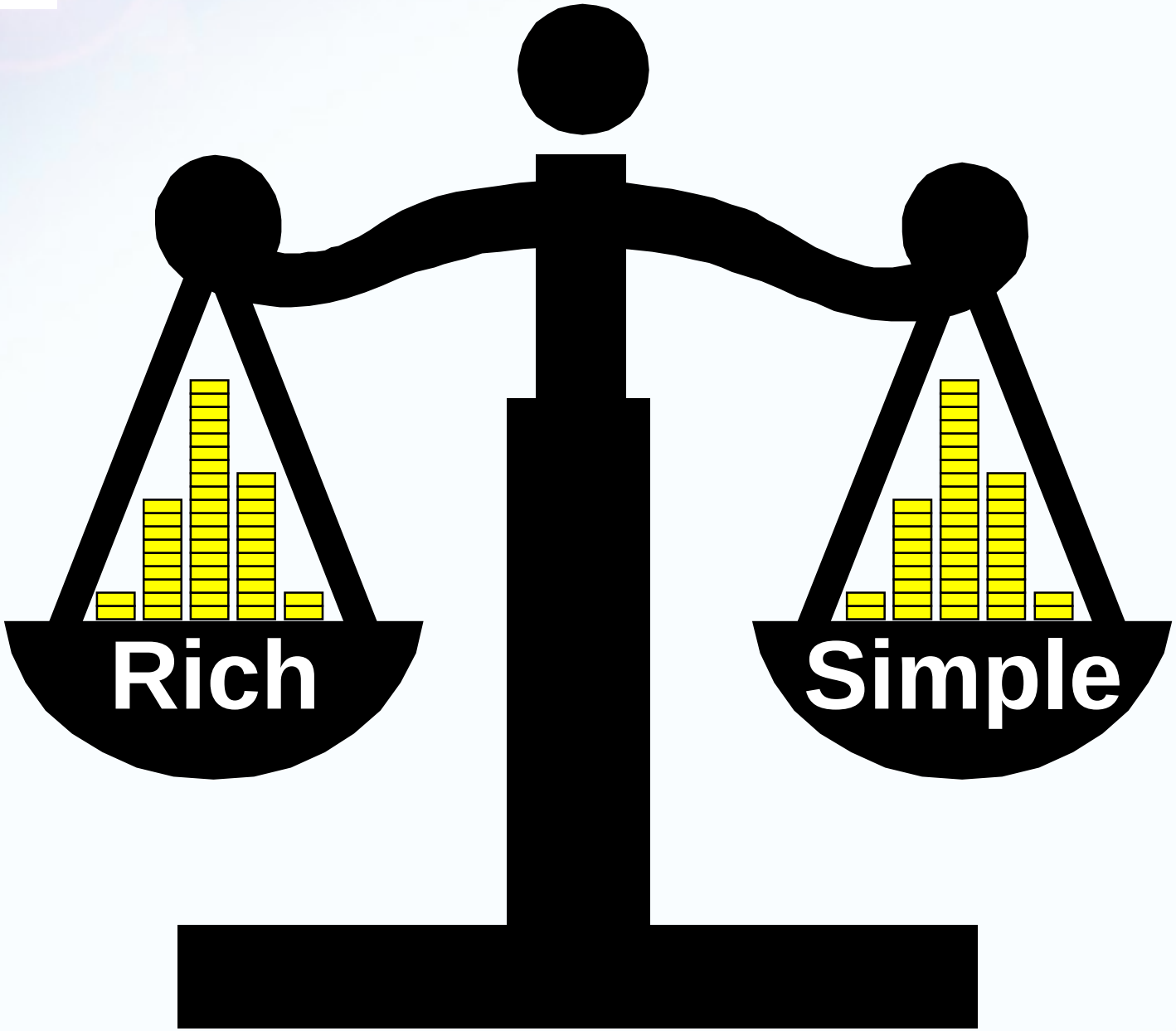
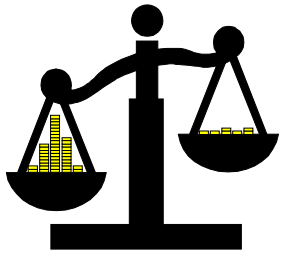


IPv6

What is
the history of
rich and simple
solutions?

IPv6

Balanced solutions that meet requirements - win!



Ethernet had the right balance of
richness and simplicity

Token Ring
didn't

Ethernet switching had the right balance of
richness and simplicity

LAN emulation
didn't

IPv6

Balanced solutions that meet requirements - win!

But the Phone Network wasn't both "rich & simple" until it added...

IPv6

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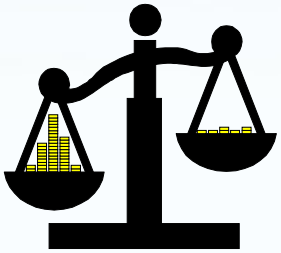

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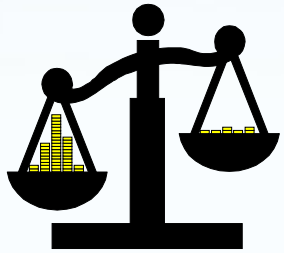

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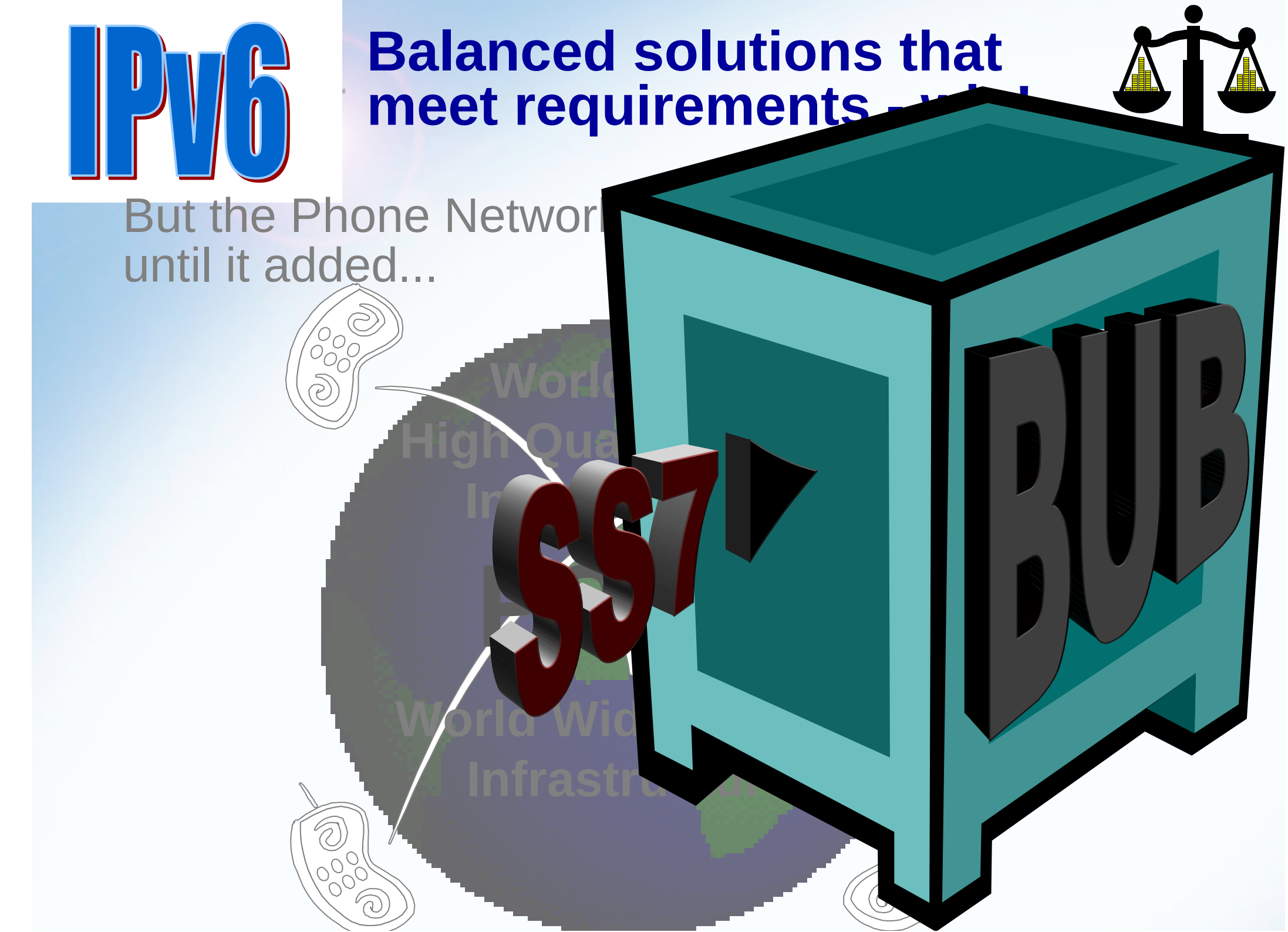

IPv6

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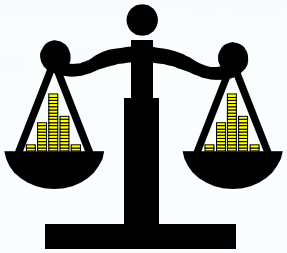

IPv6

Balanced solutions that meet requirements

Why does it
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DYNAMIC CON

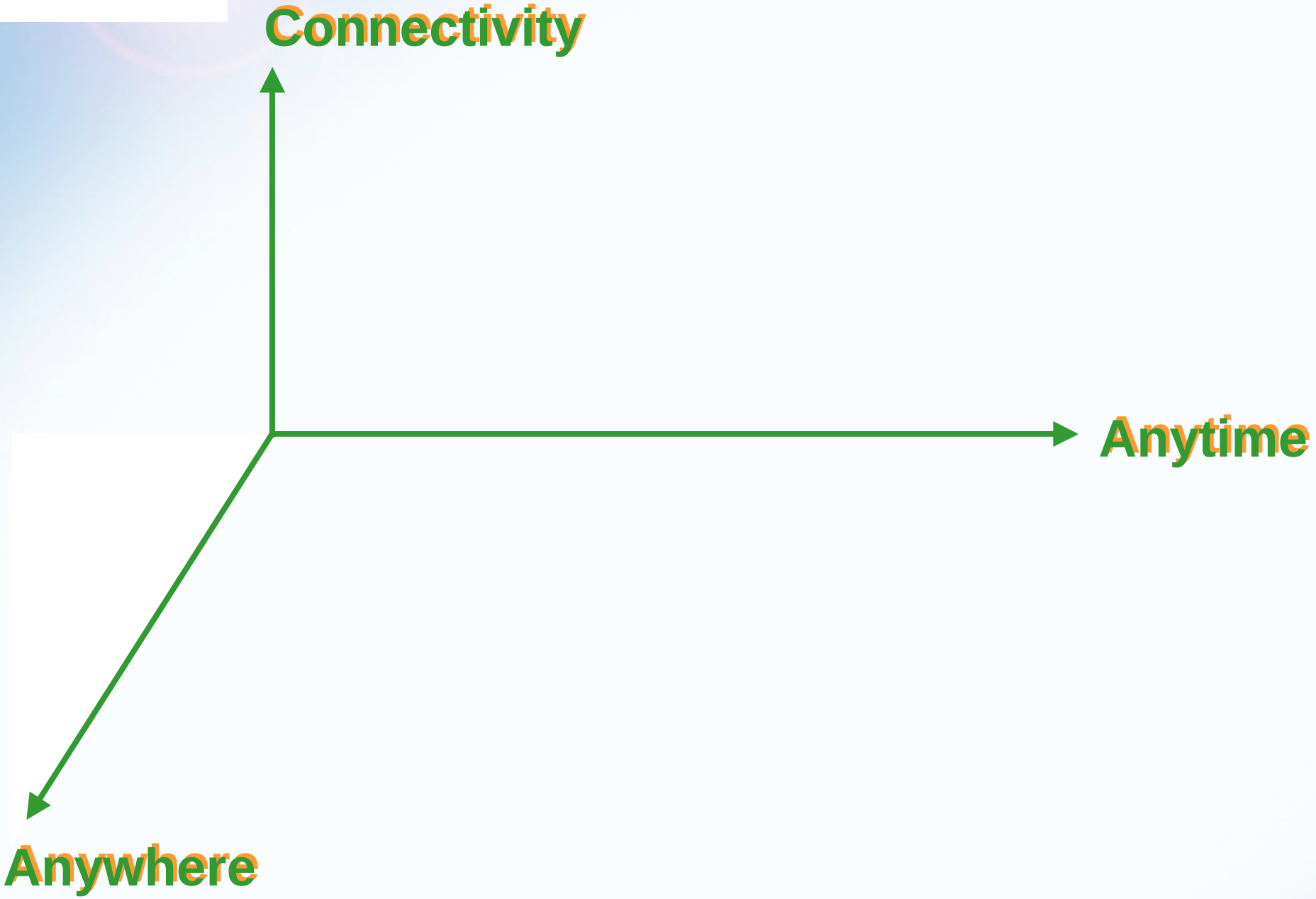
Clusters

IPv6

Next generation architecture

IPv6

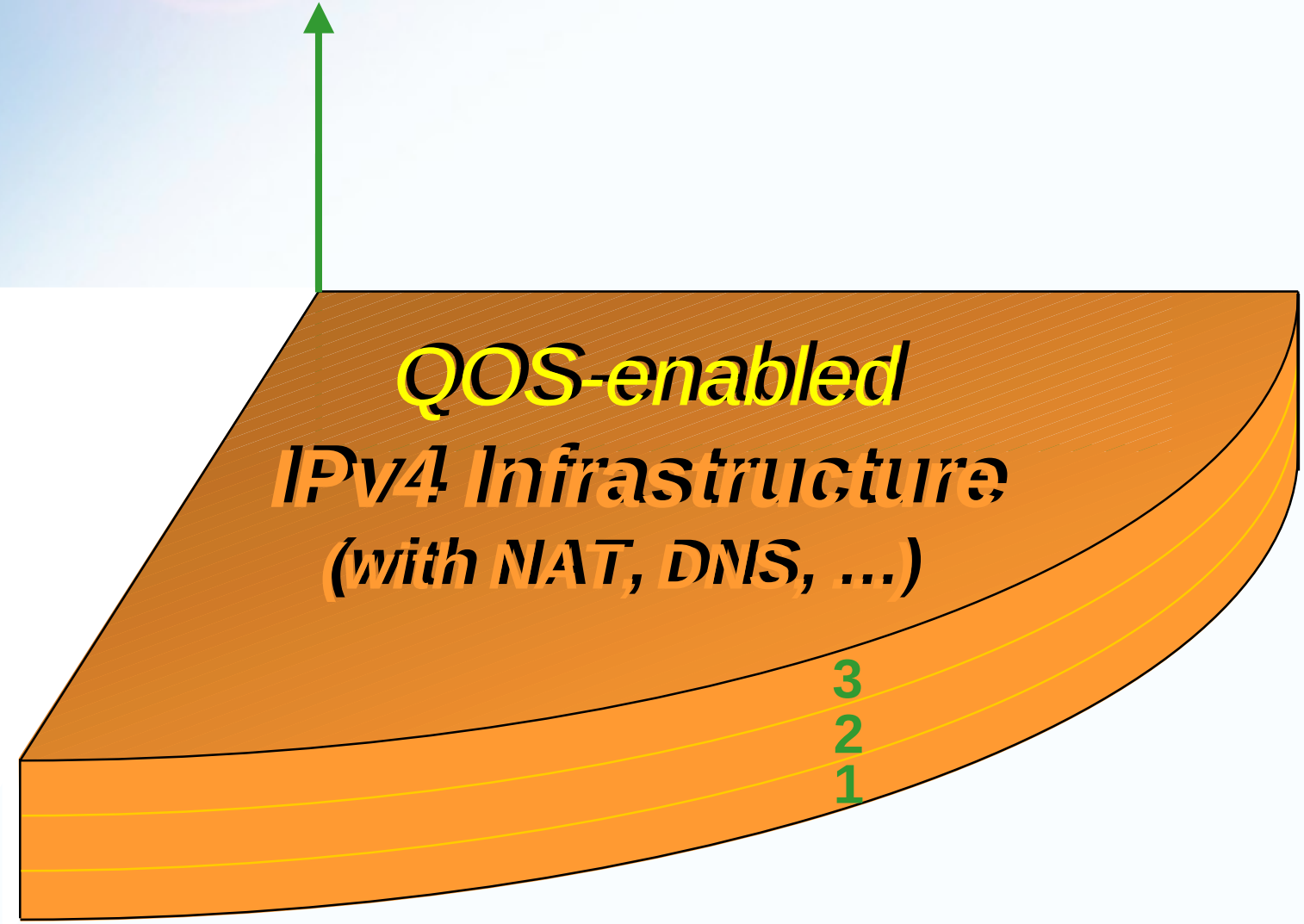
One way of looking where we are.



IPv6

One way of looking where we are.

Connectivity: Data Only, Converged?



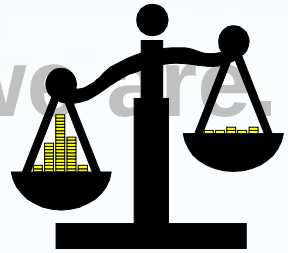
Anytime: 24x7

Anywhere: Portable

IPv6

One way of looking where we are

Which gives us "Rich & Simple"



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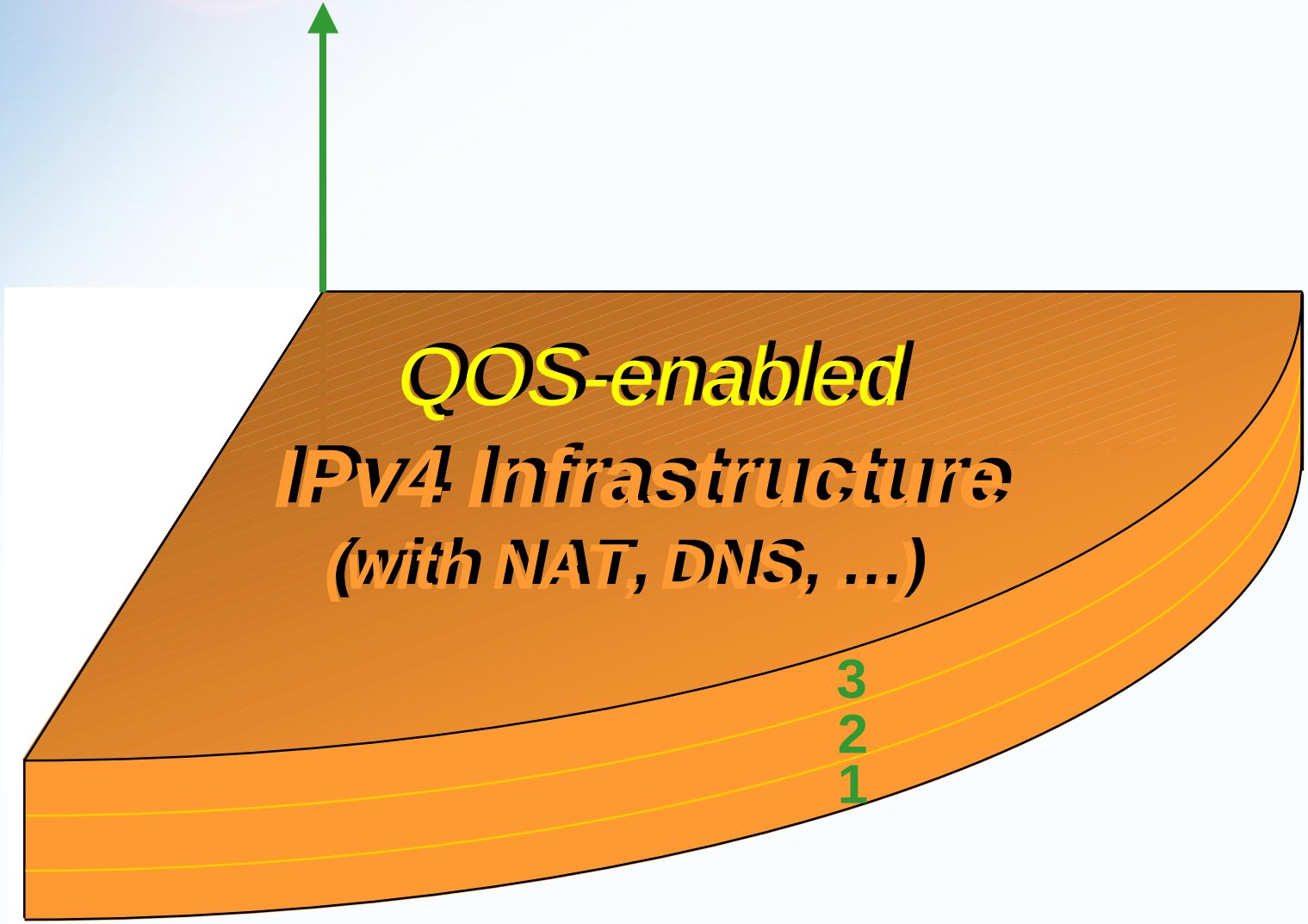

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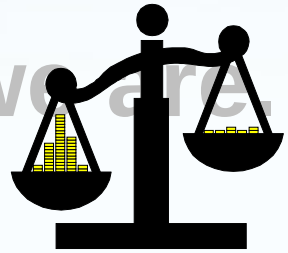
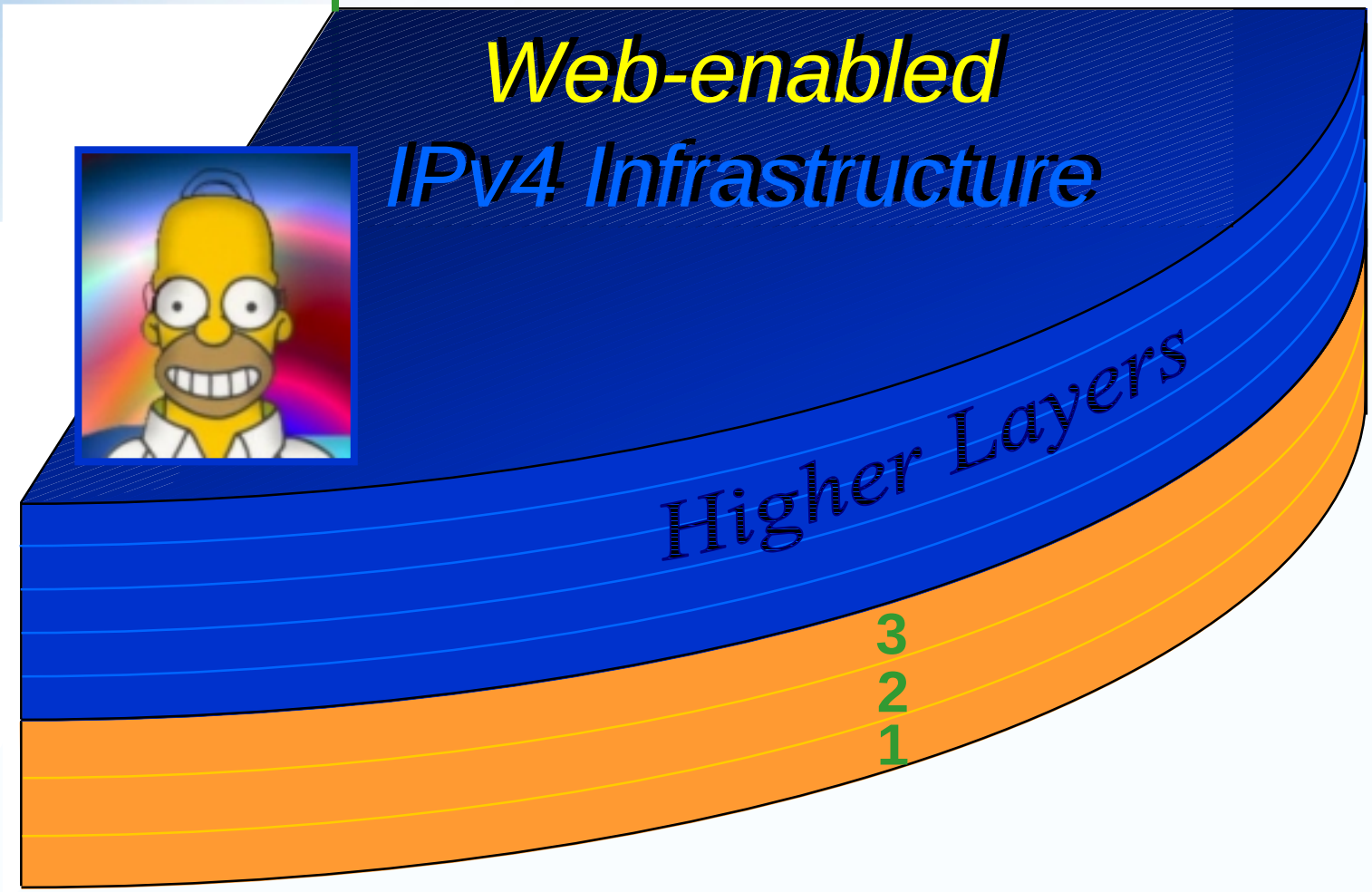


Connectivity: Data Only, Converged?

Automatic, Seamless, Safe?



Anytime: 24x7

Anywhere: Portable, Mobile?

IPv6

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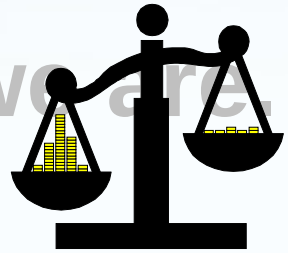

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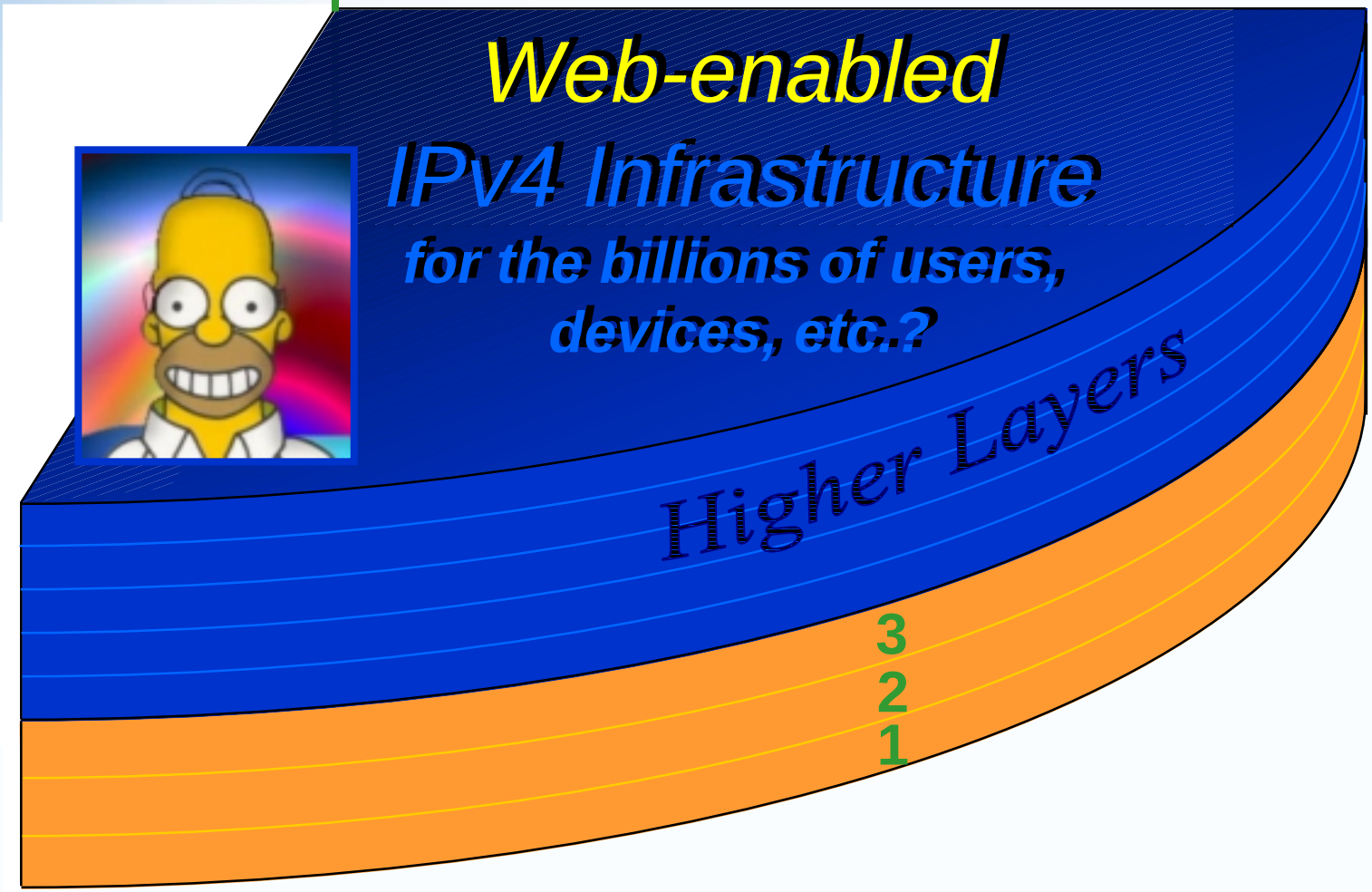

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Anywhere: Portable, Mobile?

IPv6

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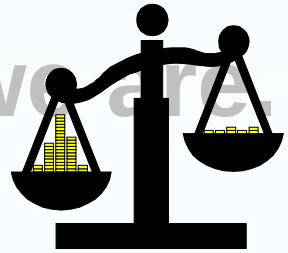

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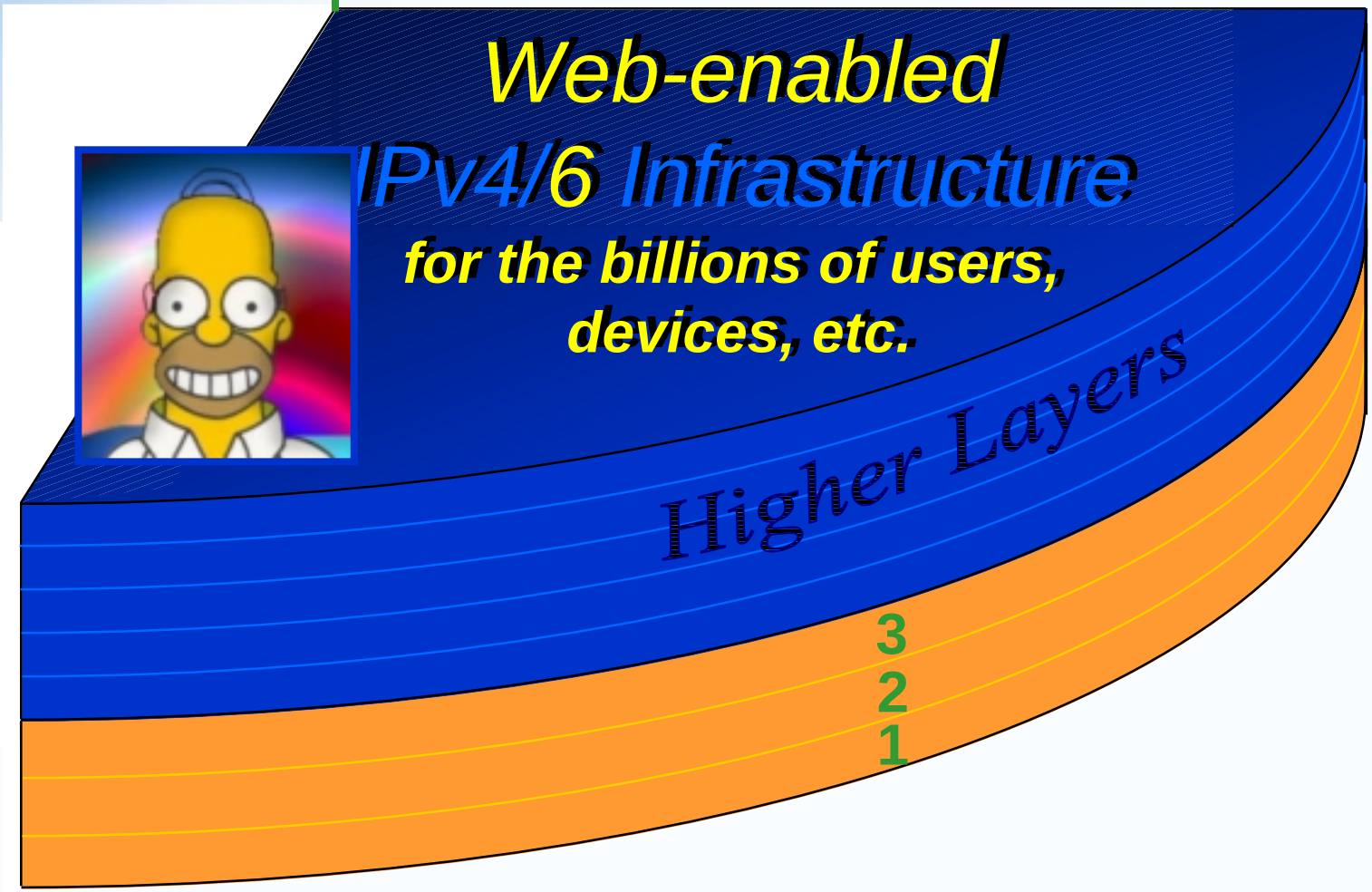

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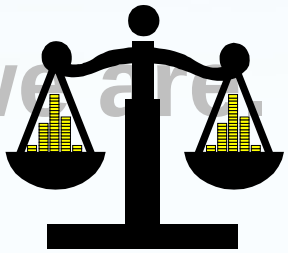

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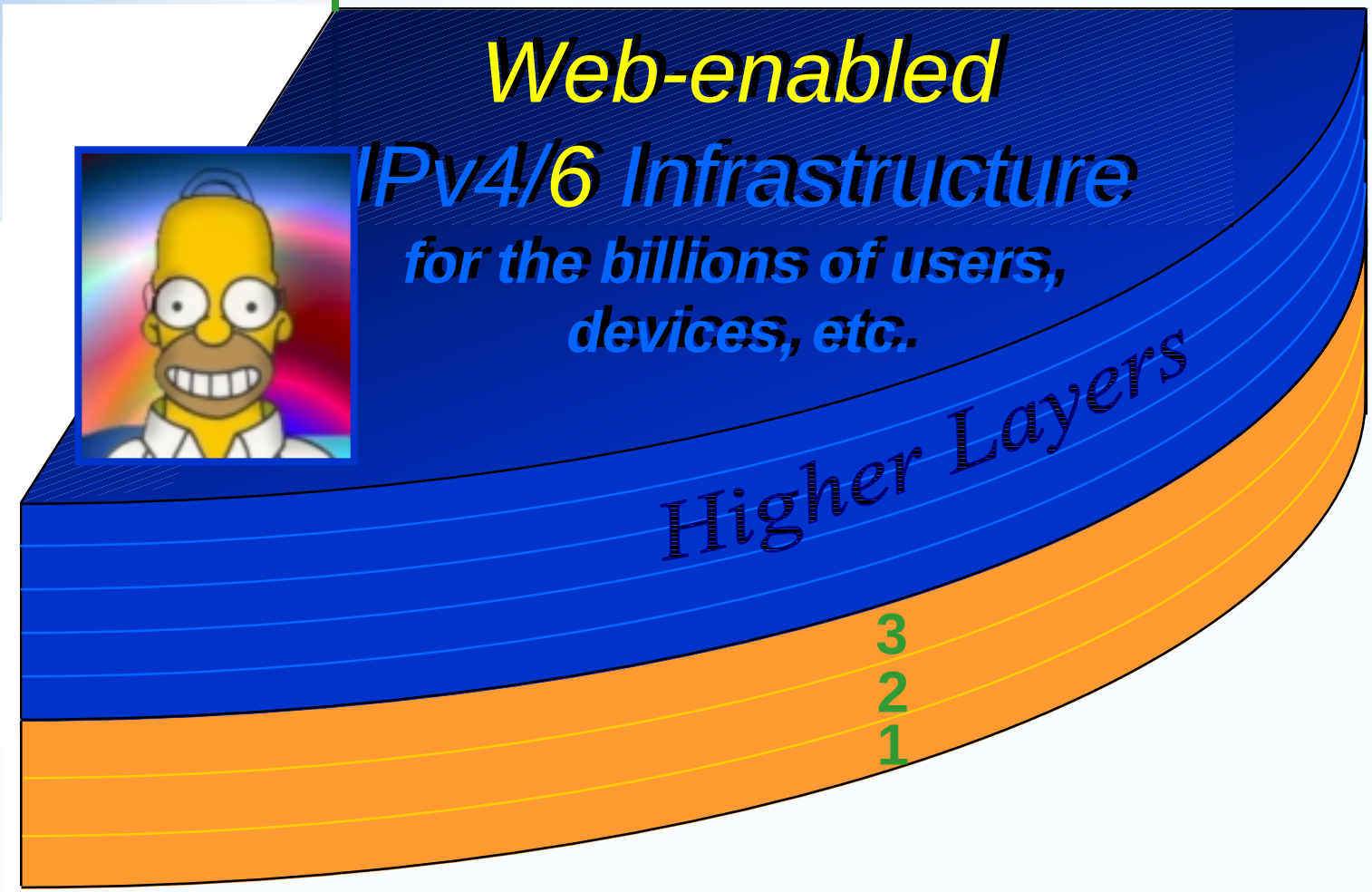


Anytime: 24x7

Anywhere: Portable, Mobile

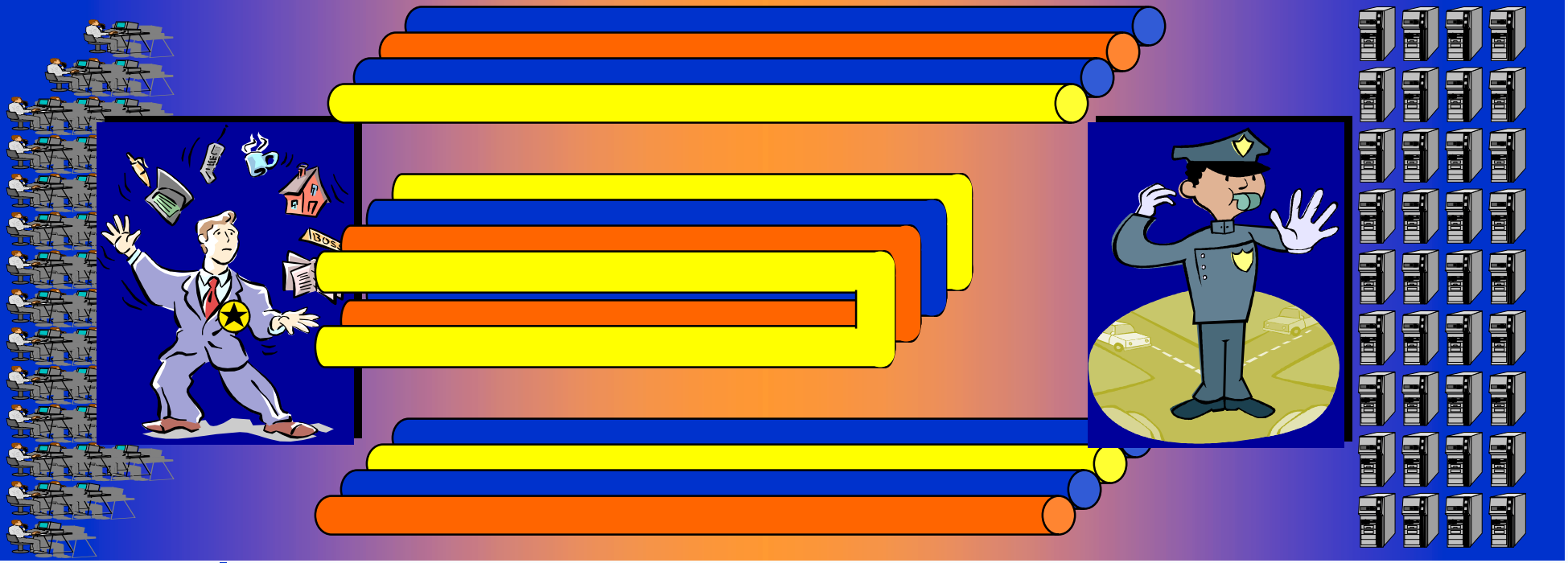
IPv6

Resulting "Rich" and "Simple" Architecture for

Web-enabled IPv4/6 Control Infrastructure

QOS-enabled IPv4 Packet Infrastructure

Web-enabled IPv4/6 Control Infrastructure



Personal Clusters

End-to-End Connections

Server Clusters

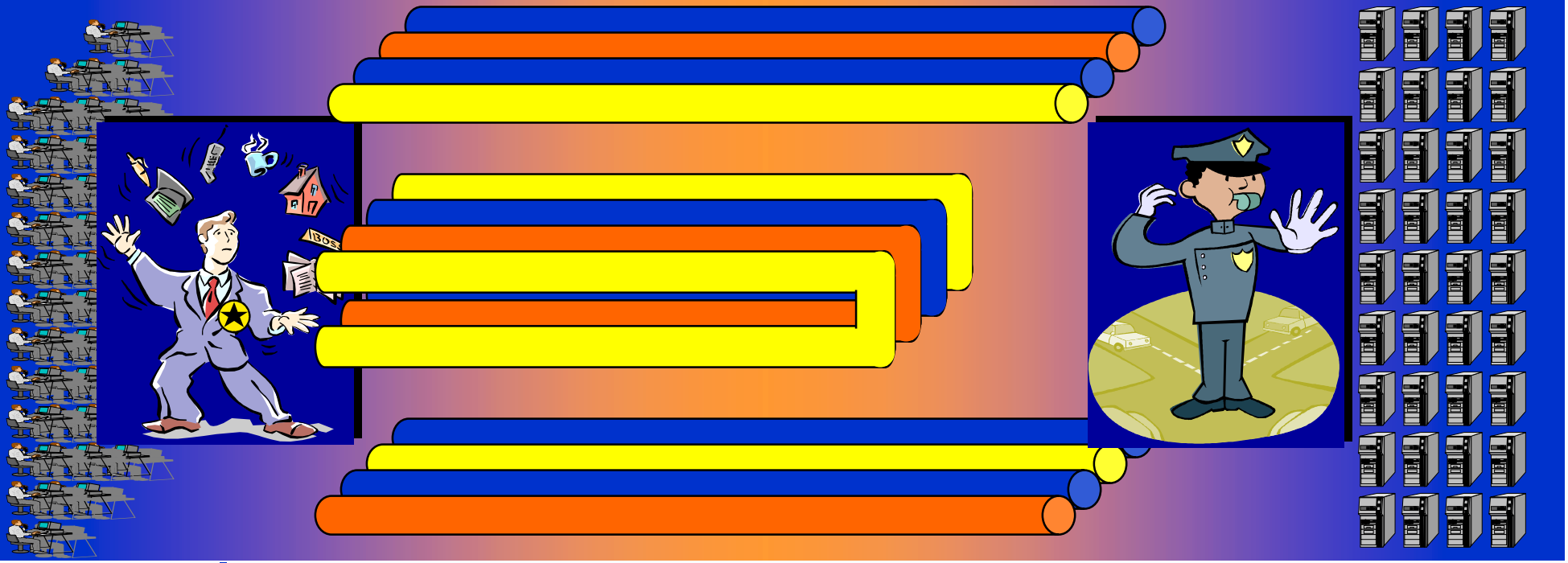
IPv6

Resulting "Rich" and "Simple" Architecture

Web-enabled IPv4/6 Control Infrastructure

QOS-enabled IPv4/6 Packet Infrastructure

Web-enabled IPv4/6 Control Infrastructure



Personal Clusters

End-to-End Connections

Server Clusters

IPv6

Conclusions

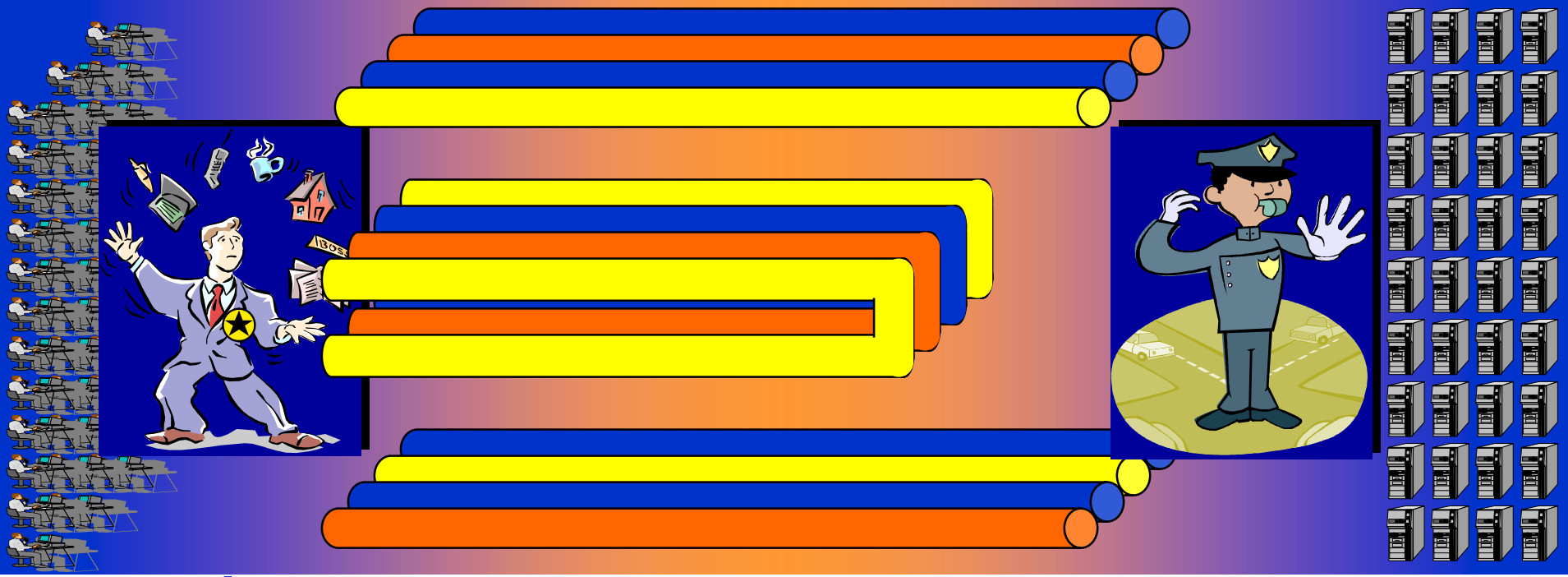
IPv6

Next generation network conclusions

Web-enabled Control Infrastructure

QOS-enabled Packet Infrastructure

Web-enabled Control Infrastructure



Personal Clusters

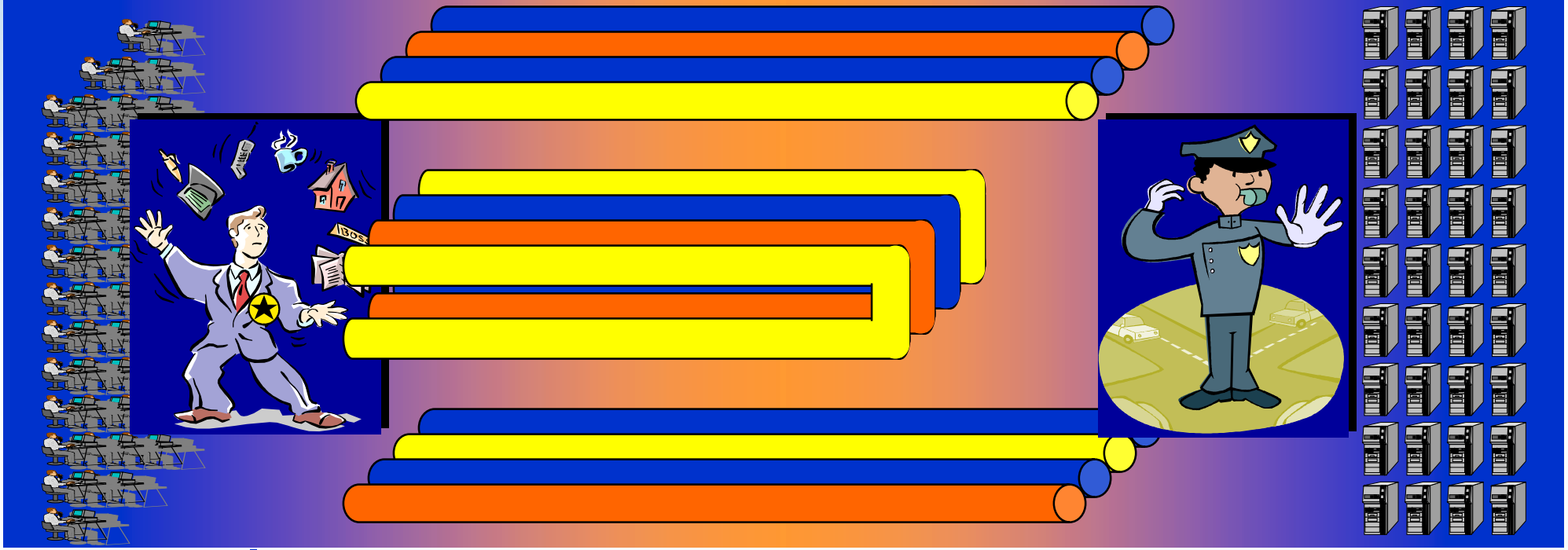
End-to-End Connections

Server Clusters

IPv6

Next generation network conclusions

Next generation networks will consist of interconnected Personal and Server Clusters



Personal Clusters

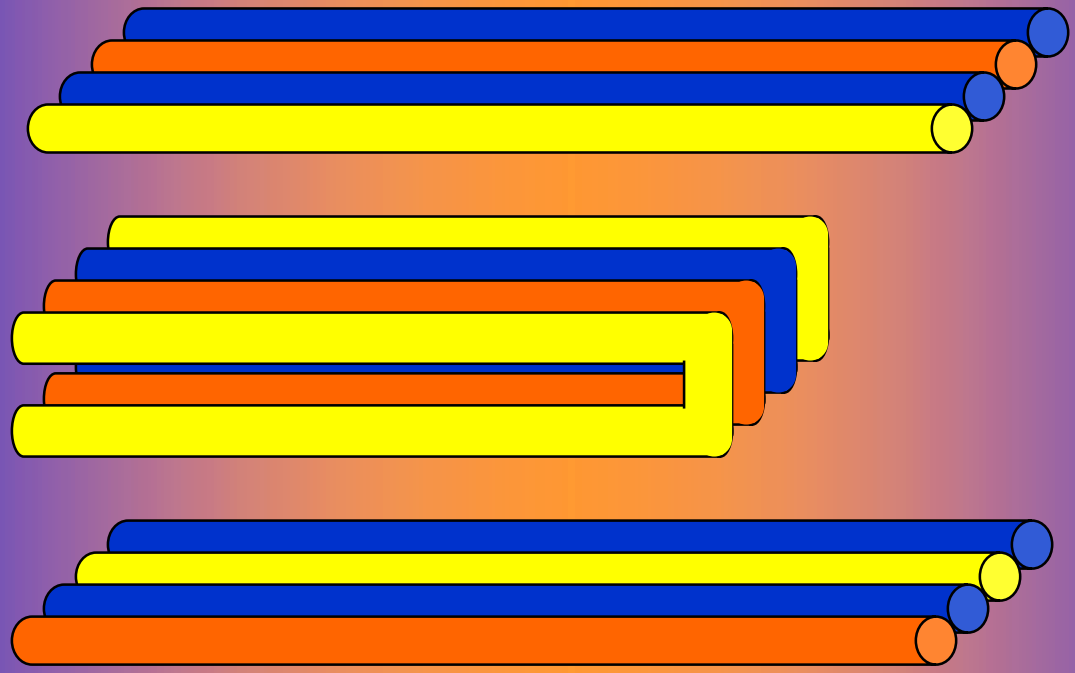
End-to-End Connections

Server Clusters

IPv6

Next generation network conclusions

The center of the network must significantly increase in capacity



End-to-End Connections

IPv6

Next generation network conclusions

Consequently, there must be a migration of higher layer functionality to the edge clusters including

- **Security** (firewalls, authentication, encryption, etc.)
- **policy** (user and server traffic filtering/management)
- **mobility** and **transportability**

Personal Clusters

Server Clusters

IPv6

Next generation network conclusions

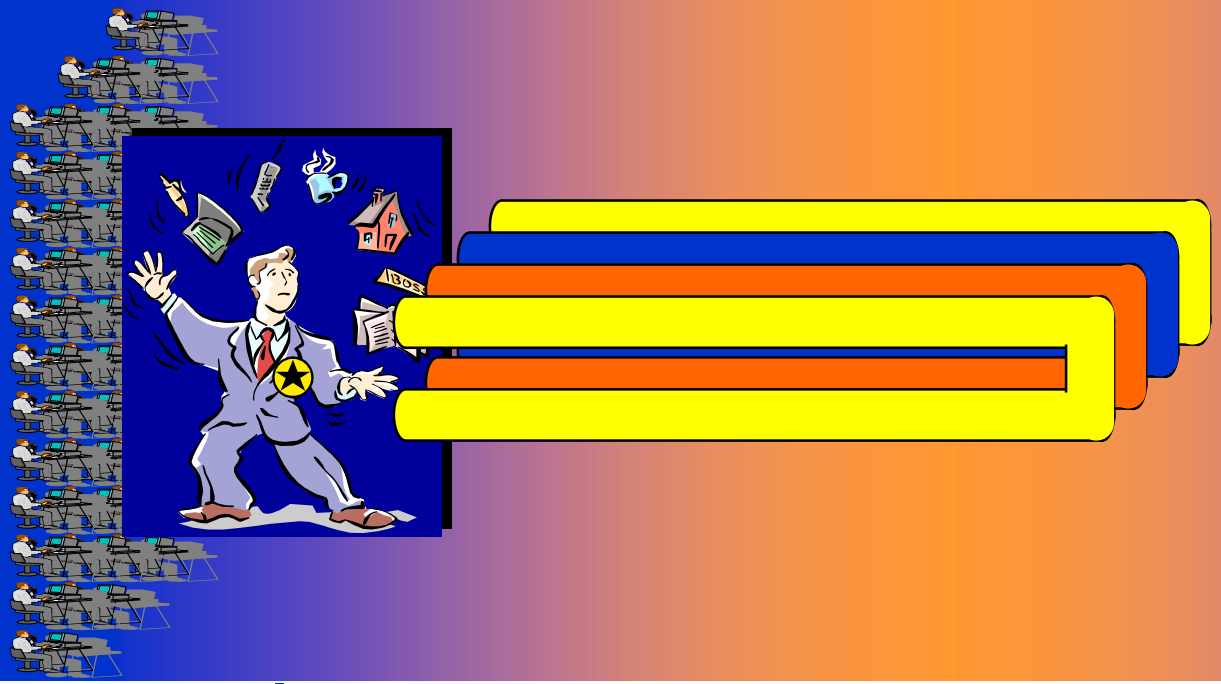
The Personal Traffic Manager/Gateway is the obvious place to begin the IPv6 transition

Personal Clusters

IPv6

Next generation network conclusions

Do not underestimate
the impact of direct
user-to-user connectivity!

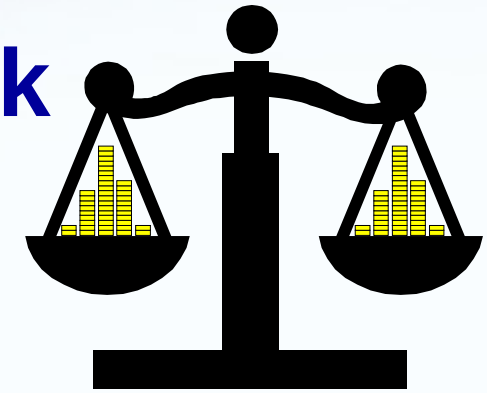


Personal Clusters

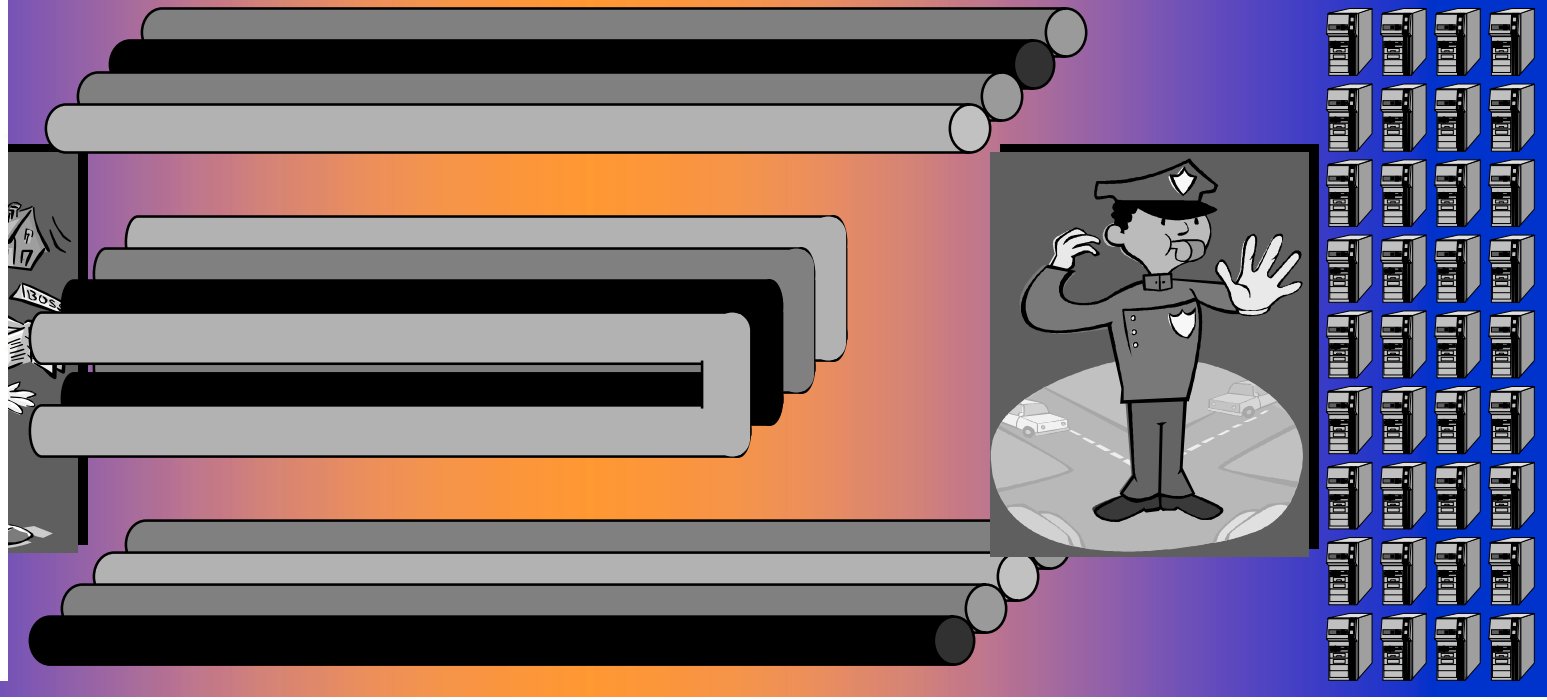
End-to-End Connections

IPv6

Next generation network
one final point



Do not forget Homer!



Personal Clusters

End-to-End Connections

Server Clusters

For more information,
please visit
www.3com.com

Thank you!

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For more information, please visit www.3com.com

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IPv6

Internet Appliances:
A new category of devices

Internet Radio