ITU Kaleidoscope 2011
The fully networked human?
Innovations for future networks and services

Net-Centric World: Lifestyle of 21st century

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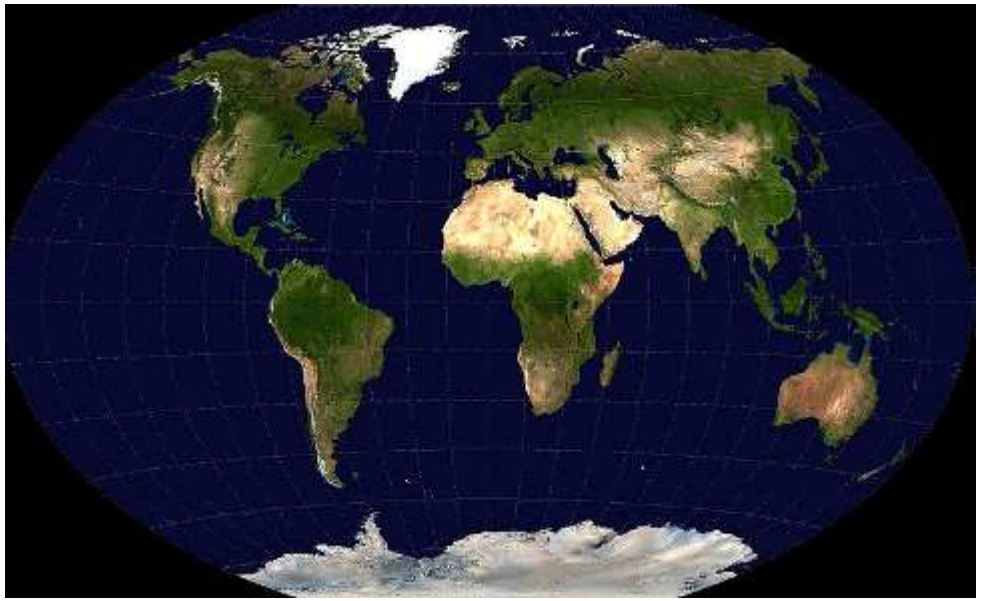
12–14 December 2011

PLANET EARTH: STATISTICS

Surface: 148,940,000 km² (land)

Human inhabitants: 6.8 billion (Feb 2010)

Urban areas: 1.5% of the land mass

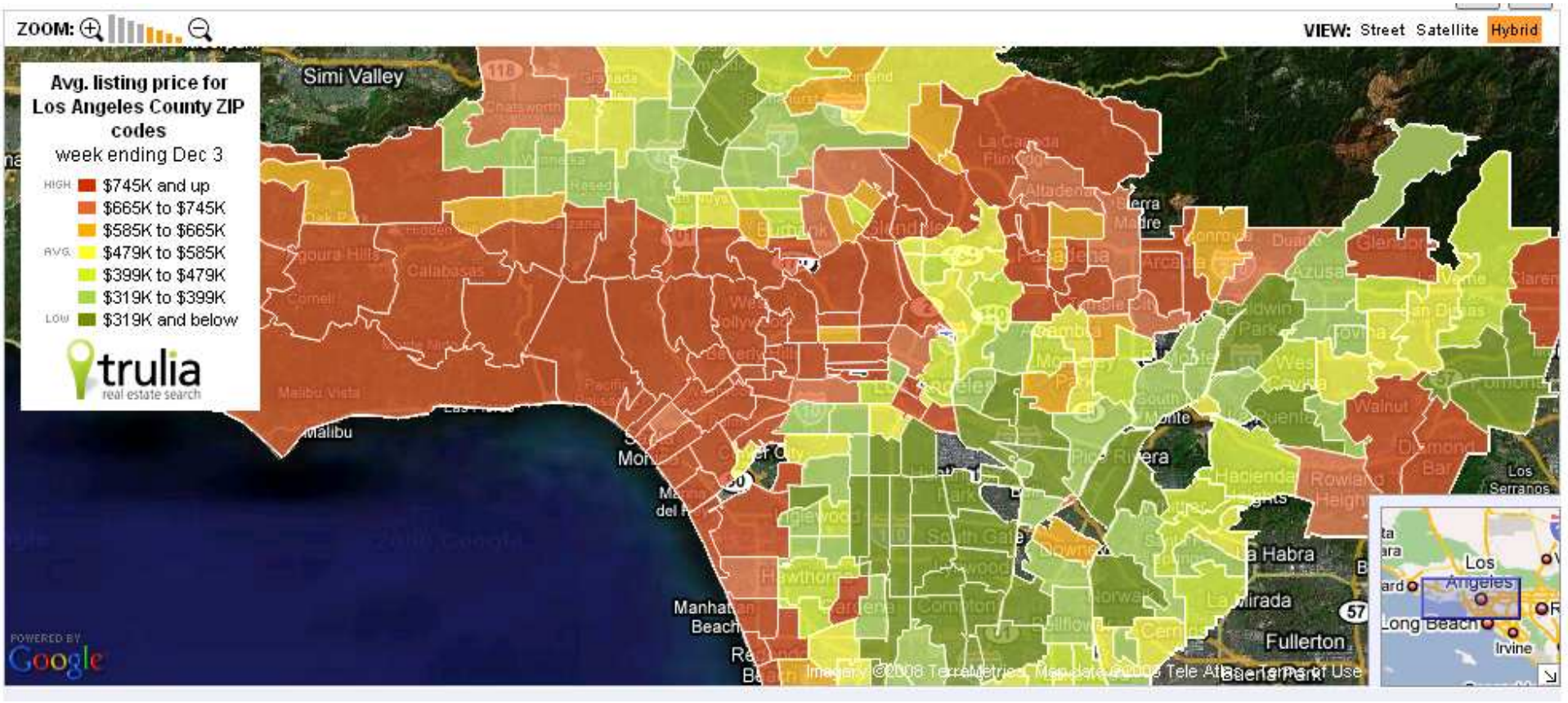


Source: Wikipedia

Land Use	Percentage
Arable Land	13.13%
Permanent Crops	4.71%
Permanent Pastures	26.0%
Forests and woodlands	32.0%
Urban Area	1.5%
Other	30%

PLANET EARTH: URBANIZATION

Only **1.5%** of land is urbanized.
But this land is in high demand



THE ORIGINS OF COMMUTE

Cost of land creates commute – daily migration of humans
Commute maps are largely inverse to real estate price maps

Source: Google.com (LA county, Dec 15 2008, 9:00am PST)

WHY COMMUTE?

Housing options are limited by proximity to the office

LIVING IN COMMUTE-CENTRIC WORLD

Housing Options out of Reach for Worker based in Los Angeles, CA

TRANSPORT IN COMMUTE-CENTRIC WORLD

US census bureau (2008): 100 hours and 4,000 miles of loss per year per worker

COMMUTE COST

- Excessive use of fossils/energy for transportation
- Monetary impact to consumers and businesses
- Active daytime wasted on transportation
- Degraded professional performance
- Reduced quality of personal living

TELECOMMUTING, ANYONE?

In a poll of more than 1,500 workers by Dice Holding in June 2008 37% of respondents said they would take “less" pay to telecommute

2008 *InformationWeek* Research National Salary Survey of 9,653 IT professionals reported 15% named "telecommuting/work from home" as a job factor that matters most

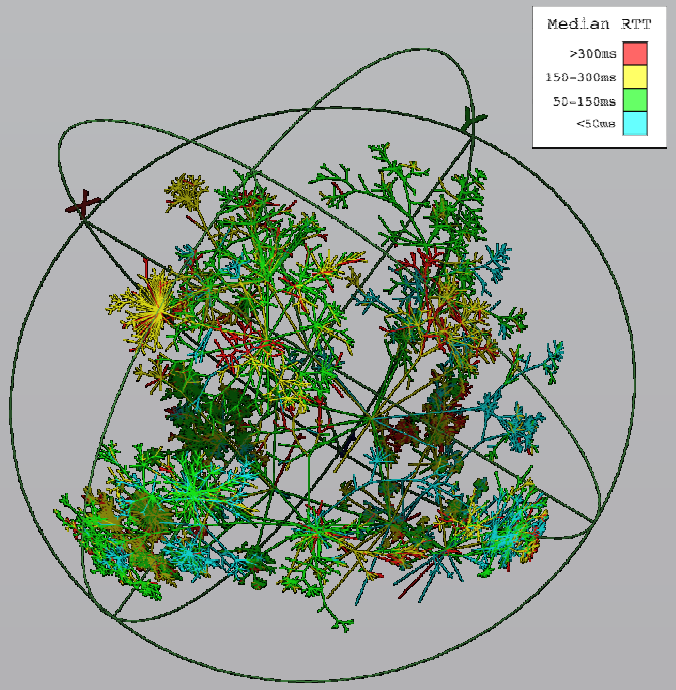
However, polls reveal telecommuting acceptance remain low

Less than 7% of Dice Holdings respondents already work remotely

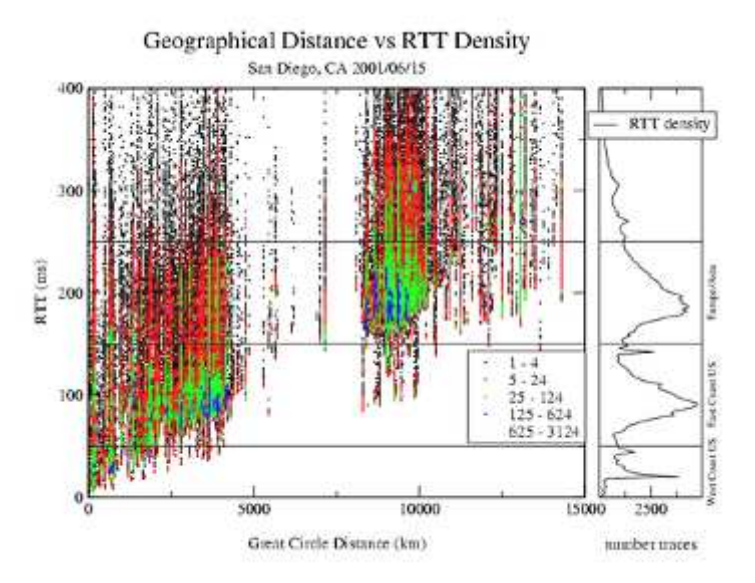
Is not the norm, it's still an anomaly says Erik Fleishman, manager of Sapphire's Sacramento, Calif., office and West Coast regional recruiting division.

FROM CHALLENGES TO A NEW VISION

The center of human activity the 21st century is not a physical place. It is a **network**, the physical location of which has little meaning compared to a logical proximity measured between the source and the user of network content



NETWORK AS A CENTER OF MODERN SOCIETY



Bandwidth, delay and security policies define experiences and opportunities. **Net-Centric Factor** (NCF) describes ability to perform remotely

$$\textbf{NCF} = \frac{\text{online tasks}}{(\text{offline tasks} + \text{online tasks})}$$

- Maximum delay needs not to exceed 200ms boundary to contain virtual people moving in real-time virtualized environment (distributed office model)
- Sustained bandwidth requirements are driven by user profile and range from 4Mbps for streaming video to 100Mbps for real-time
- Locations not reachable within bandwidth, delay and security requirements remain limited to legacy modes of information exchanges (such as material media, physical collaboration etc)

NETWORK IS A CATALYST FOR CHANGE

What if every one of us could choose any place to live and work?

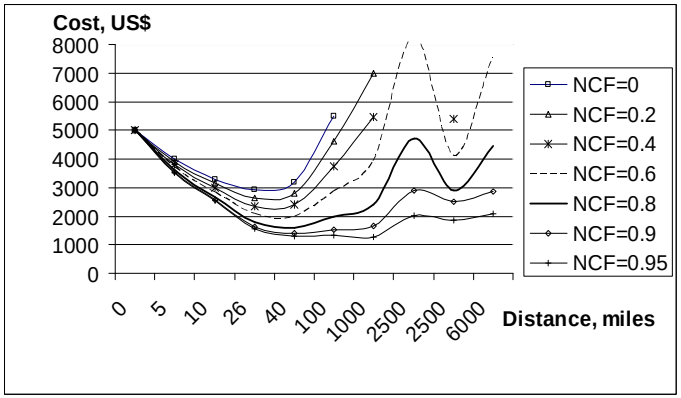
- All major metropolitan areas of US and Europe are already within 200ms RTT connectivity
- Broadband operators (Google, VZ) are starting to offer 100Mpbs+ access speed in 2010

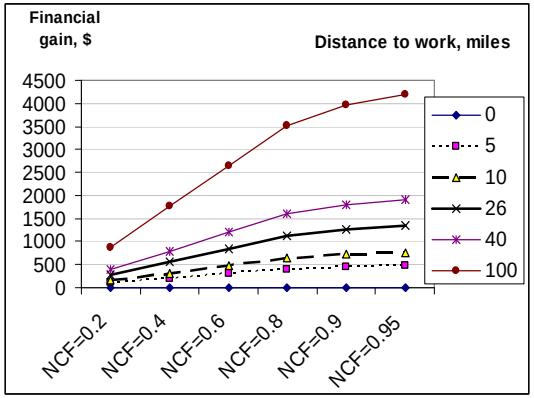
What if we could dematerialize major pollution sources?

- GESI 2020 report estimates ICT potential to reduce world pollution at 21.9Gt CO_2

NET-CENTRIC ECONOMY BASICS

$$Sv > \sum_{i=1..N} C_i t + C_c * (1 - NCF)$$





Distance to Work/ Time to Work	House/ Month	Commute		Monthly Cost of Housing Plus Transport						
		Mode	*Cost**	*NCF = 0*	*0.2*	*0.4*	*0.6*	*0.8*	*0.9*	*0.95*
0 miles / 5 minutes	$5,000	Walk	*$0*	*$5,000*	*$5,000*	*$5,000*	*$5,000*	*$5,000*	*$5,000*	*$5,000*
5 miles / 20 minutes	$3,500	Tram/Bus	*$25*	$4,000	$3,900	$3,800	$3,700	$3,600	$3,550	$3,525
10 miles / 30 minutes	$2,500	Car	*$40*	$3,300	$3,140	**$2,980**	**$2,820**	**$2,660**	**$2,580**	**$2,540**
25 miles / 45 minutes	$1,500	Car	*$71*	**$2,980**	**$2,636**	**$2,352**	**$2,068**	**$1,784**	**$1,642**	**$1,571**
40 miles / 60 minutes	$1,200	Car	*$100*	$3,200	$2,800	**$2,400**	**$2,000**	**$1,600**	**$1,400**	**$1,300**
100 miles / 120 min.	$1,100	Car	*$200*	$5,500	$4,620	$3,740	**$2,860**	**$1,980**	**$1,540**	**$1,320**
1000 miles / 180 min.	$900	Train/Air	*$480*	N/A	$6,980	$5,460	$3,940	**$2,420**	**$1,660**	**$1,280**
2500 miles / 300 min.	$1,100	Air	*$900*	N/A	N/A	$12K	$8,300	$4,700	**$2,900**	**$2,000**
2500 miles / 300 min.	$1,200	Air + hotel†	*$900*	N/A	N/A	$5,400	$4,100	**$2,900**	**$2,500**	**$1,850**
6000 miles / 840 min.	$1,300	Air + hotel†	*$2,340*	N/A	N/A	N/A	$7,580	$4,440	**$2,870**	**$2,085**

***** Roundtrip cost, including time loss at $0.5/minute and transport at $0.5/car mile or $200/$600/$1,500 for short/mid/long-haul airtickets

† Housing cost includes $200/night hotel surcharge on commute days.

PERSONAL LIFESTYLE CHANGES

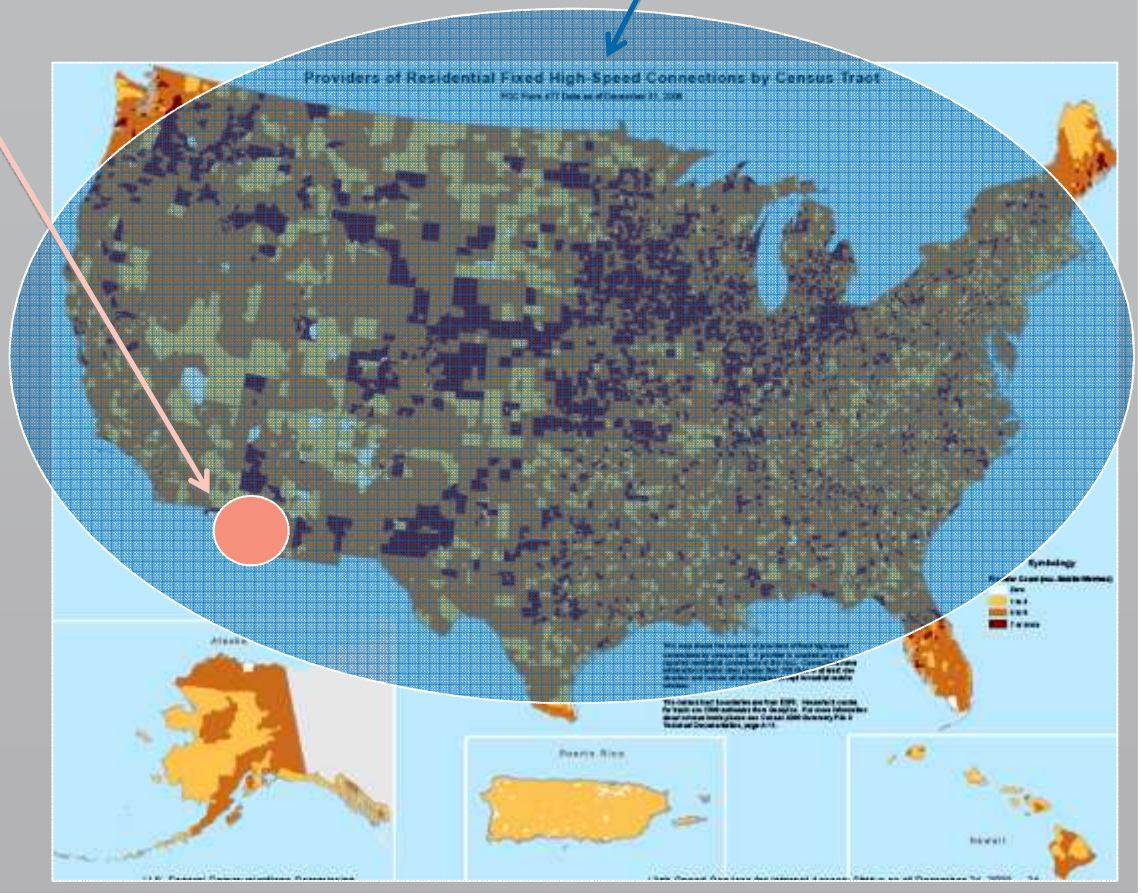
Commute-Centric World
(settlement radius)

Net-Centric World
(settlement radius)

"Mobility is not a box. It's a way of life"

Practically, Net-centric world citizens enjoy a freedom of movement within well-connected areas geographically located within +2/-2 hour difference

For company HQ in Los Angeles, this includes the entire Canada, USA and select areas in Central and South America



TELCO PROGRESS STRONGLY SUPPORTS THE CASE

Year	Event	Implications
1999	Internet growth problem solved	Hardware-based packet forwarding frees Internet from major speed limits
2002	Smartphones with integrated enterprise e-mail functions	Instant access to corporate e-mail for high-end businesses
2003	Unlimited cell dataplans in USA	Flat-rate plans with full e-mail and web over GPRS/EDGE
2007	Unlimited data plans for iPhone	Full mobile web experience within 50 US states with Apple smartphone
2008	86 million high-speed Internet connections (200Kbps+) in US	Broadband Internet widely available in US
2009	Unlimited corporate international data plans for select smartphones	Flat-rate worldwide plans with full e-mail and limited (compressed) web over GPRS/EDGE
2010	Google announced high-speed wireline ISP plans	Users are promised 1Gbps+ access speeds into Google multimedia content and Internet

GREAT. I'M SOLD. WHAT'S THE CATCH?

	Virtual Experiences				
	Message	***Verbal***	***Visual***		***Rich multimodal***
Media	*IM/SMS*	*Phone*	*Video Stream*	*Telepresence*	*Virtual Reality, 3D Video, etc.*
Quality/reliability	Medium	High	Low	High	High
Minimum bandwidth	160 Bytes	9 Kbps	0.2-2 Mbps	2-4 Mbps	5-20 Mbps
QoS requirements	Low	High	Medium	High	Very high
Proximity/Cost					
Local/LAN	$0	$0	$0	$0	$0
Metro area/DSL	~$0	~$0 (VoIP)	~$0 (IP Video)	$0.5/min[c]	$10/min[c]
National mobile	$0.1[a]	$0.25/min[a]	$0.05/min[b]	Not supported	Not supported
International mobile	$0.5[a]	$4[a]	$10/min[b]	Not supported	Not supported

a) U.S. average GSM voice and short text tariffs b) U.S. 3G data tariffs c) U.S. leased line tariffs based on one hour/day usage

THE MAIN CHALLENGE OF TELECOMMUTING

✖ I cannot get what I need even if I pay extra!

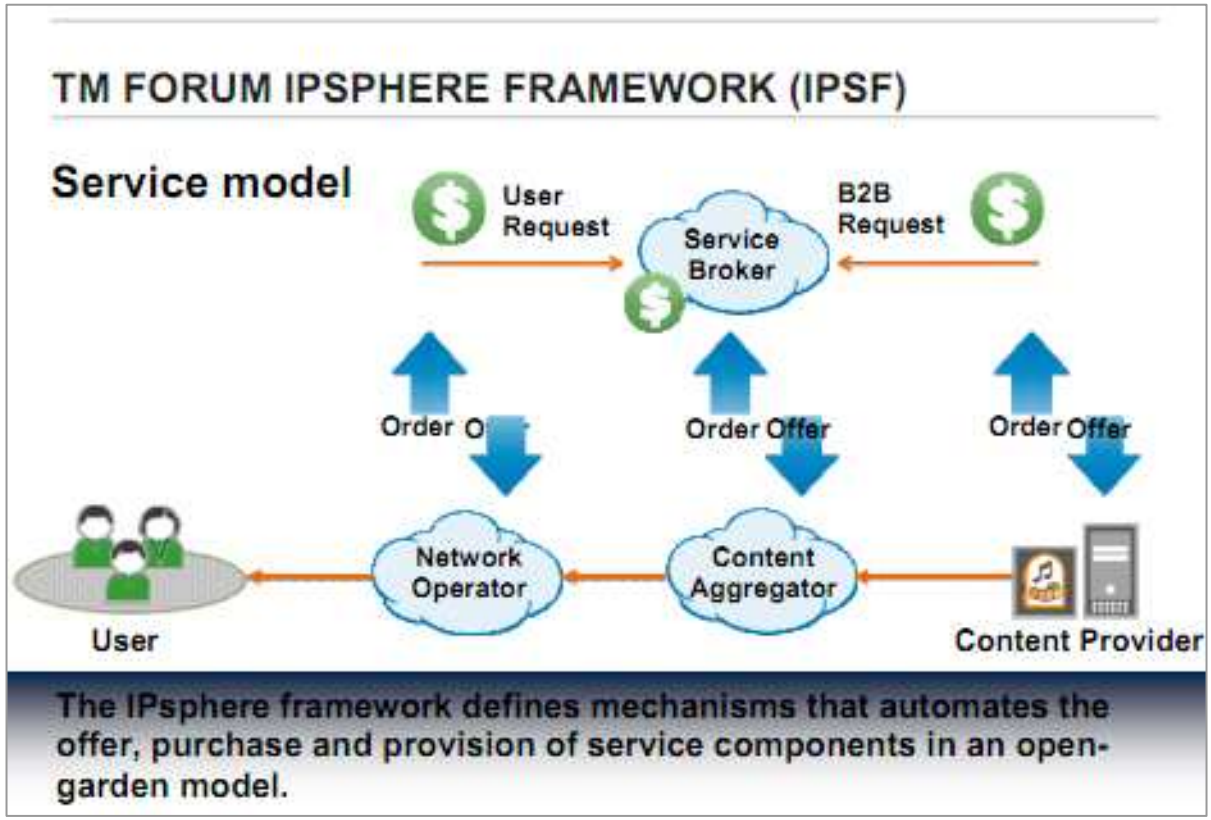
Fixed line user	Requirements	Problem
LAN-like access to corporate data	10Mbps+ best-effort pipe between remote worker and corporate HQ	No way to prioritize over best-effort Internet
Rich multimedia experience	4Mpbs+ expedited forwarding pipe to content source for watching 720p video	No QoS services between user and content source
Secure data transmission	VPN, firewall and deep packet inspection for all remote worker connections	Secure gateways do not scale to multi-gigabit speeds

Wireless user	Requirements	Problem
Full IP/web experience	Sustained throughput of 2Mbps or better	Not possible on 3G networks
Minimum-level business multimedia (eq. NetMeeting)	500Kbps+ expedited forwarding pipe to the content source	No QoS services in the wireless broadband networks

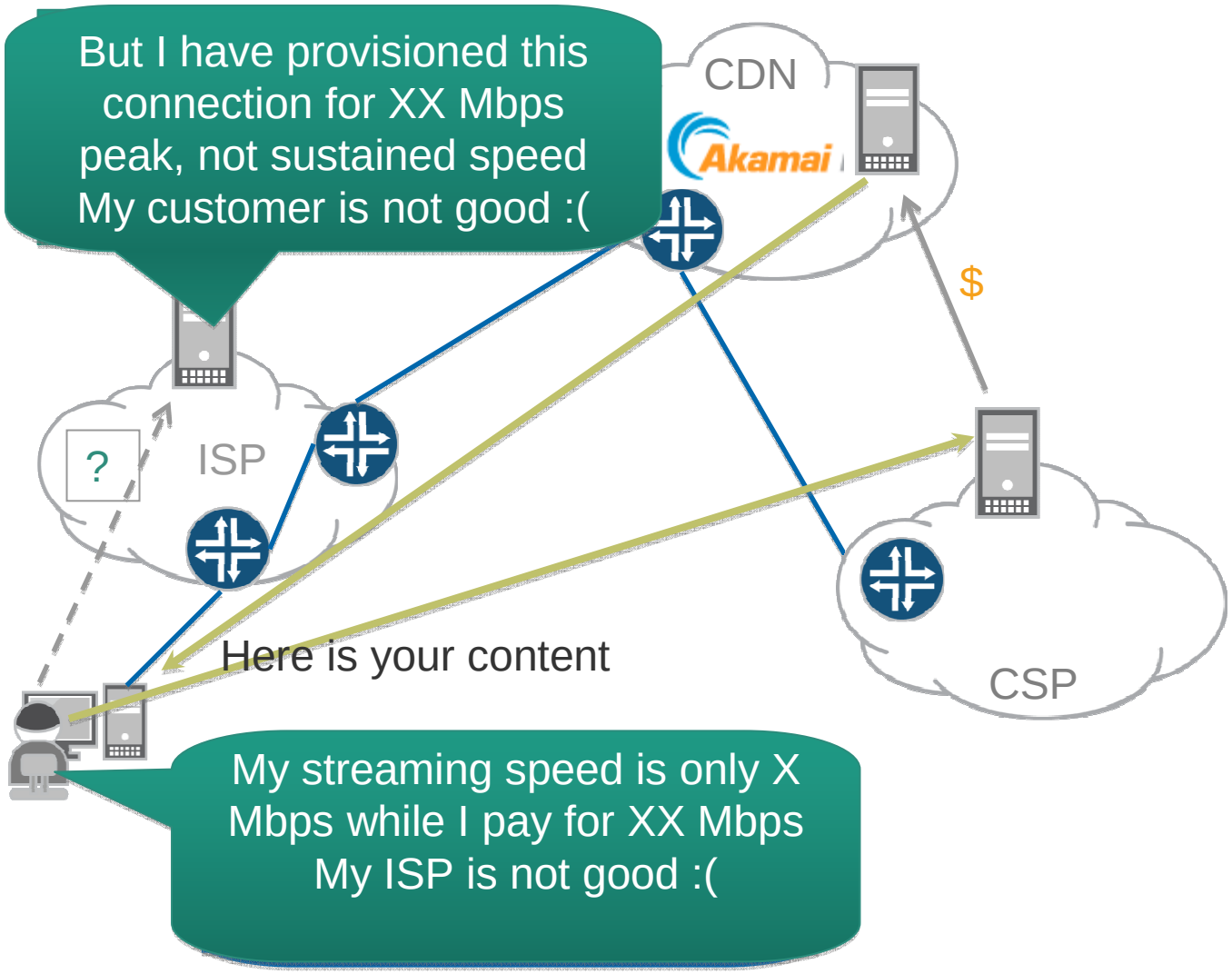
IS THERE AN EXISTING SOLUTION?

IPSF - Great idea.

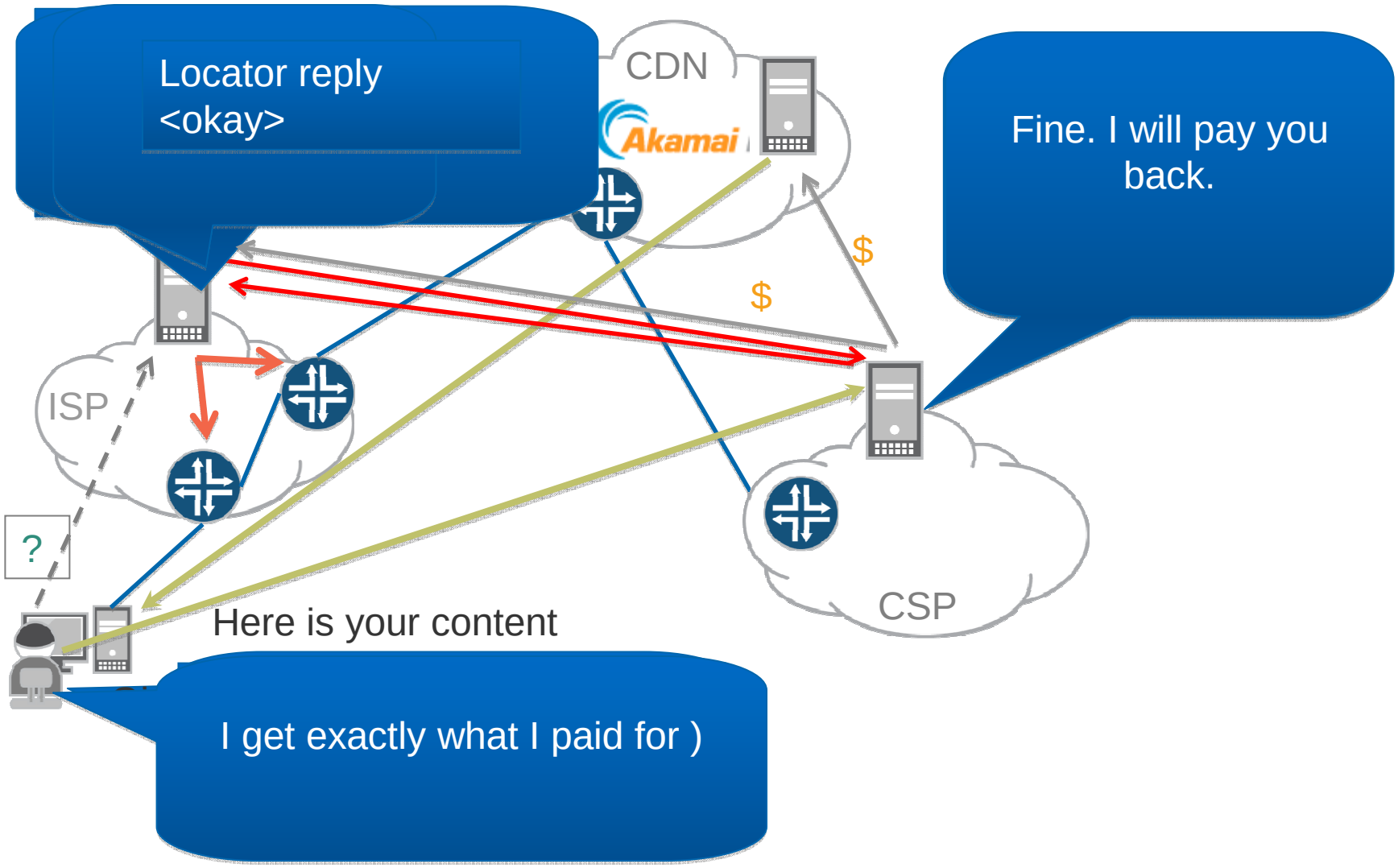
But lot's of complex moving parts and proprietary OSS work :(



WHAT DO WE HAVE TODAY, REALLY



WHAT DO WE REALLY NEED?



NEW NETWORK PROGRAMMABILITY

Function	Old	New
Path setup	Proprietary OSS connectors into RSVP config stance	PCE
Resource identification	Static interprovider agreements	ALTO
Call clearing	Static clearing procedures	IPSF framework
Network topology	Generalized, any-to-any web	Simplified case – CDN connects directly to user access network

CONCLUSION

Internet revolution is far from being over

We are about to witness tectonic socioeconomic changes

ICT industry remains at the forefront of development

Standardization and simplification is the key for a change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