# *EU FP7 R&D in Telecoms*
# *Drivers, Motivations & Expectations*


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# Trends: Social Networking


- 1 Billion subscribers in Social Networking Websites WorldWide
- 154 Million people accessing a Social Networking Website every day
- 3 Billion minutes spent on Social Networking every day
- 8 Billion pages accessed on Social Networking Websites every day

# Next step: 3-D Internet

**Multiplicity of Virtual World Platforms, 60 M users estimate**

**Confluence of trends: social networks, user generated content, immersive experience, rich media**

**3D pioneered through Games**

**A possible approach to information overload**

**Not any more in the academic domain**

**New business perspectives**

**Inside**

**Connected**

**Individual**

**Level of Interaction**

**Time**

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# 2D vs 3D Loops

User clicks on URL

Server generates HTML image

2D Browser renders content

User clicks on URL

Collect Changes from users

Resolve all interactions

New per user model

3D Browser renders model

Frame rate iteration

# Performance Aspects

**Server**

| Type | SW | Client/Server |
|---|---|---|
| MMORPGS | EVE ON LINE | 34420 |
| MMORPGS | WoW | 2500 |
| Virtual World | Second Life | 160 |

**10 to 100 times more computation power per Client**

**Client**

| | % CPU Use | %GPU Use |
|---|---|---|
| 2D Web site | 20 | 0-1 |
| Google Maps | 50 | 3-5 |
| Google Earth | 60 | 10-15 |
| Second Life | 70 | 35-75 |

**CPU: 3X GPU: 20X+**

*Source: Intel*

**Bandwidth:** 100 increase from MMORPGS to VW, server limited

**Image:** 4 Frames/s (2004); 90 Frames/s HD end 2007

# 3D Internet: New issue, new opportunity

3D Internet brings in new issues

but opens opportunities:


- **Standards, interoperability**
- **Single Interface for all participants**
- **Solving performance issues in a multi industry context**
- **Lag time**
- **new classes of protocols**
- **development tools**
- **Modeling and simulation to unleash understanding and new insight**
- **fragmentation of industrial 3D actors**
- **leveraging Europe cultural assets**
- **Interaction virtual worlds and business integration**
- **multiple identities**
- **....................**

# Trend: Information Abundance (Pollution?)

- 2006 “digital production”: 160 exabytes, fuelled by user generated content, 12 book stacks from earth to sun;

- 6 fold increase expected by 2010, 990 exabytes (pro + non pro)

- Recorded outputs of every human language since world began: 5 exabytes;

- 25% of digital content “original, 75% “replicated” (and pirated);

- Within 3 years, 70% of created and archived content expected to come from users;

- Europe and US, about 75% of content origin. Expected to decrease (in proportion), as Asia Pacific grows;

- Networked amplified phenomenon: 253 e_mail boxes in 1998, 1.6 Bn today;

- Data storage, expanding and shrinking universe at the same time

*“Today the US alone is creating so much digital content that, sometime in 2008, it will reach a point at which current computer systems and telecoms will simply be unable to cope with it all and thus the race is on to provide new technologies, methodologies and systems that will permit not only the storage but also* ***easy and quick access to and retrieval, analysis and manipulation of the saved data****.”*

**Towards more information centric computing architectures**

Source: IDC consultancy report,”The expanding Digital Universe” March 2007

# Search: a strategic industrial asset

***"Mobile giants plot secret rival to Google"*, Sunday Telegraph,** 05/02/2007

Europe's biggest telecoms groups are aiming to create a ***mobile phone search engine*** that could challenge Yahoo! and Google, the US giants. Vodafone, France Telecom, Telefonica, Deutsche Telekom, Hutchison Whampoa, Telecom Italia and one American network, Cingular, are among the companies that will come together ... with declining revenues as calls become cheaper, network operators are determined to secure a large slice of the ***lucrative search advertising market.***

**Worldwide Mobile Internet Users, Mobile Search Users and Mobile Search Advertising Revenues, 2006-2011 (millions)**

| | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 |
|---|---|---|---|---|---|---|
| Mobile Internet users | 337.3 | 405.5 | 489.6 | 596.4 | 757.1 | 982.4 |
| Mobile search users | 266.0 | 327.2 | 410.7 | 516.8 | 672.3 | 901.1 |
| Mobile search ad revenues* | $6.8 | $63.1 | $221.3 | $580.3 | $1,148.9 | $2,361.5 |

*Note: *earned from sale of display or text listings alongside mobile search results*
*Source: eMarketer, July 2007*

085440 www.eMarketer.com

# EC R&D: Way Forward

## Bricks and Mortar

Semantic Search

Speech analysis/indexing

Video analysis/indexing

Automated translation

Indexing architectures

Media feature extraction

Ranking

Relevance feedback and adaptive search

Context awareness

DRM interface…..

**Status, gap analysis, roadmap**

## Application scenarios

SE Portal Integration

Multimedia SE

Personalised Video/audio

Healthcare support

Digital MM libraries

Mobile SE

……

**Standards, take up, roadblocks**

## Business and industrial exploitation

B2B

B2C

Media

Telecoms

Health care

Culture

……

**Economic, societal prospects**

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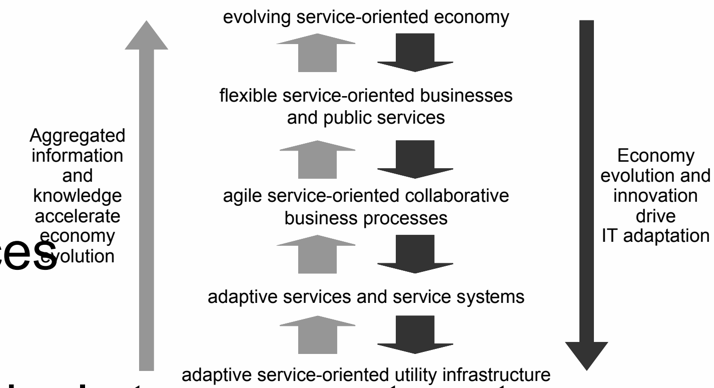
# Trend: open & Flexible Service Platforms

Software & Services: A very significant European market

- More than 215 B€ revenue – 4.4% growth in 2005, more than 6% expected in the 5 coming years
- More than one million specialists
- An engine for growth in Europe

Technological changes

- A shift from Software products to Services
- Increasing complexity and connectivity
- A Need for large distributed and increasingly transparent systems, with in built security/dependability




Key Challenges:

- Service Dynamic composition; service discovery; complexity

Source: NESSI ETP

**Opportunity:** leverage the telecom sector to develop a Software industry (next WP)

# Telecom Service context: NGN SDP's

Service Deployment Platforms today

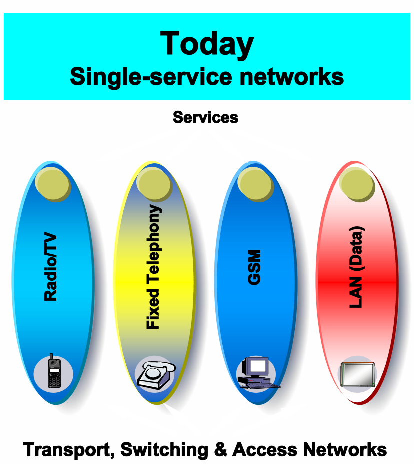
- Specialized server/middleware platforms
- Facilitate network feature/software development.

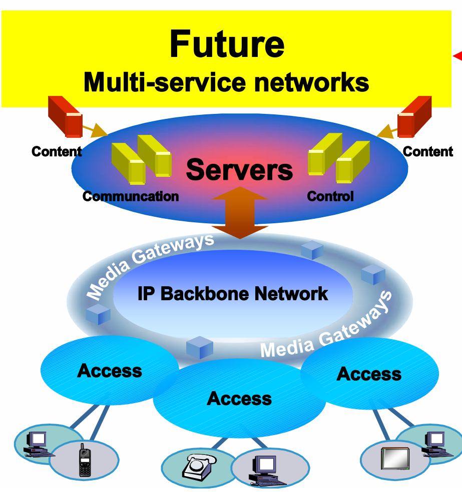
Are vertically integrated by application

- Use customized APIs
- Application deployment proliferates both SDPs and APIs

Have no specific concept of network resource control

Some providers have a dozen SDP platform types

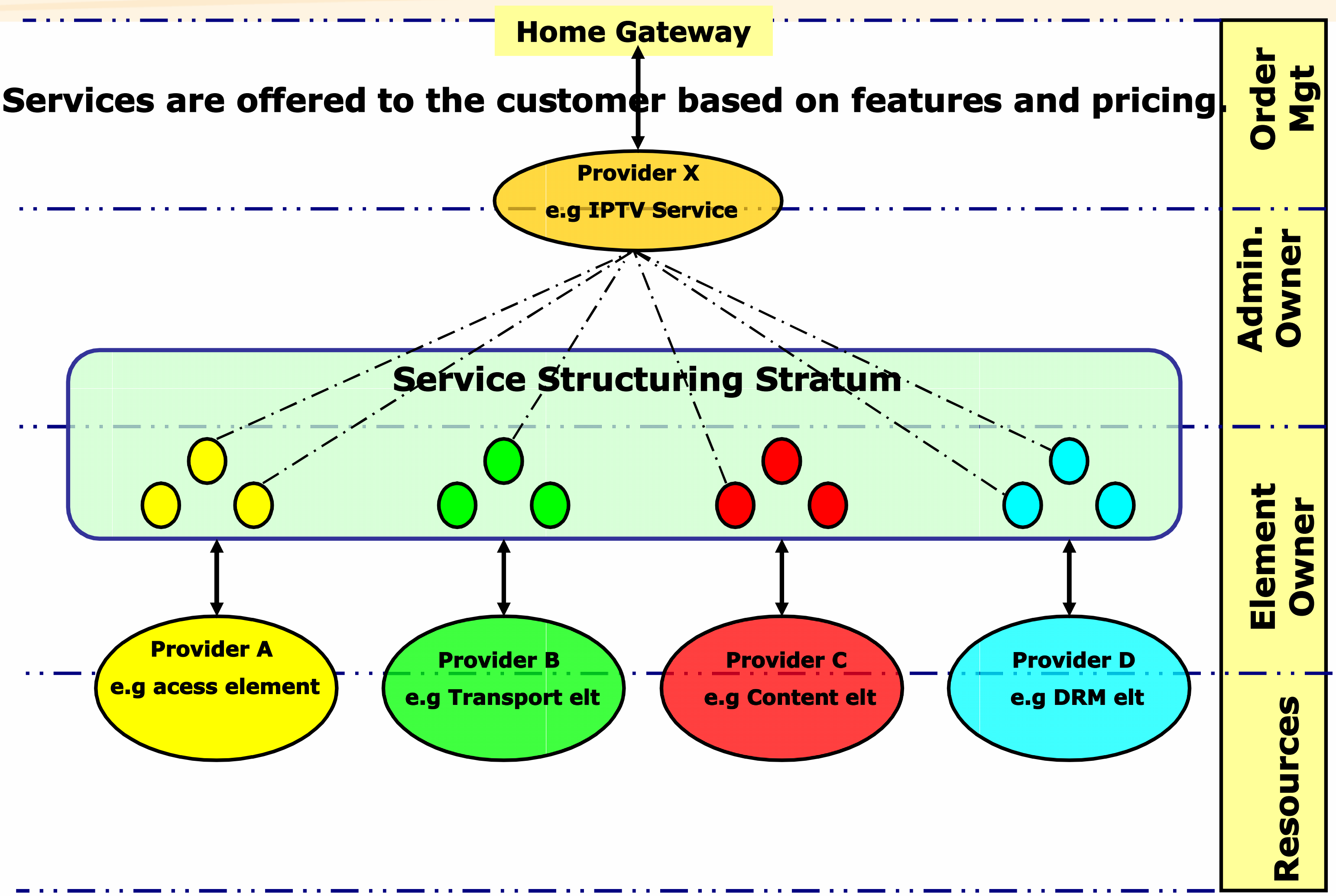



**Siloes have moved up to the service layer with SDP's**

# SoA identified as missing link

***View of the IPsphere forum***




Resource owners can build “widgets” that can be composed into services by their own retail arm or by others, and can focus on fulfilling and managing their resource commitments.

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# Service Research Drivers

- Convergence emphasize the need to provide varieties of differentiating services
- Need to equally serve business and individual environments
- Limitations of vendor service platforms
- Limitations of reference frameworks (OSA/Parlay, Liberty Alliance...)
- Horizontal reference framework /SoA towards a unified telecom/web service framework
- Intertwined network/service layers
- Context awareness/personalisation
- Overcoming static characteristics of service configurations, composability;
- SoA- GRID integration for platform independent service executions
- Virtualisation of networks, SaaS RaaS support
- Acquisition and understanding of users behaviour, towards semantic service platforms

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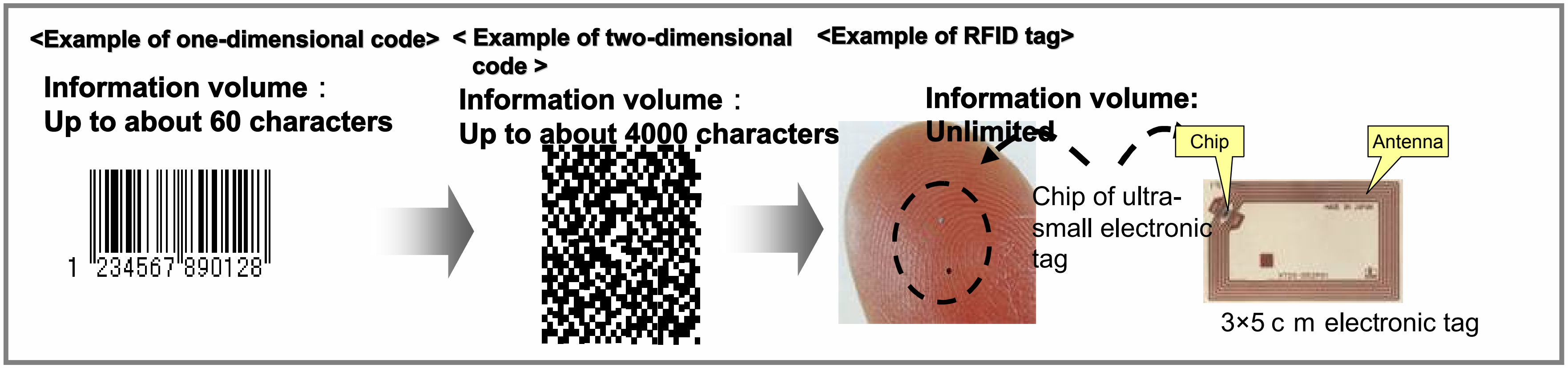
# Trend: RFID, Smart Tags: Towards an Internet of Objects

**1) Massive storage capacity** | **2) Writable** | **3) Information inside a box can be read** | **4) Can identify multiple products at once from a distance**




- **RFID tags of today expected to evolve rapidly in terms of storage and processing capabilities**
- **RFID tags expected to increasing energy harvesting capabilities**
- **RFID tags expected to be deeply networked through Internet**
- **RFID expected to represent an all encompassing structural business opportunity going well beyond the current bar code technology**

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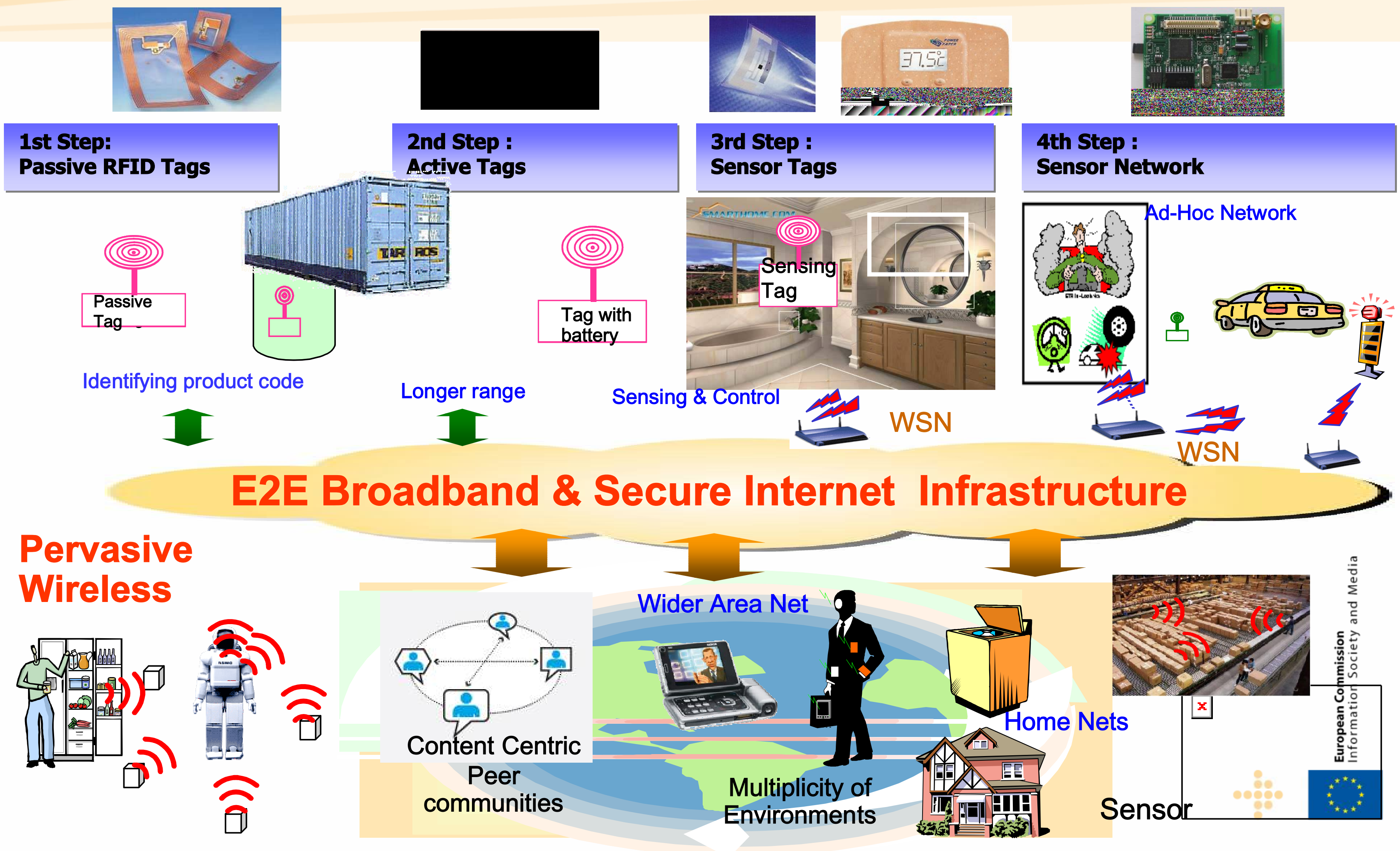
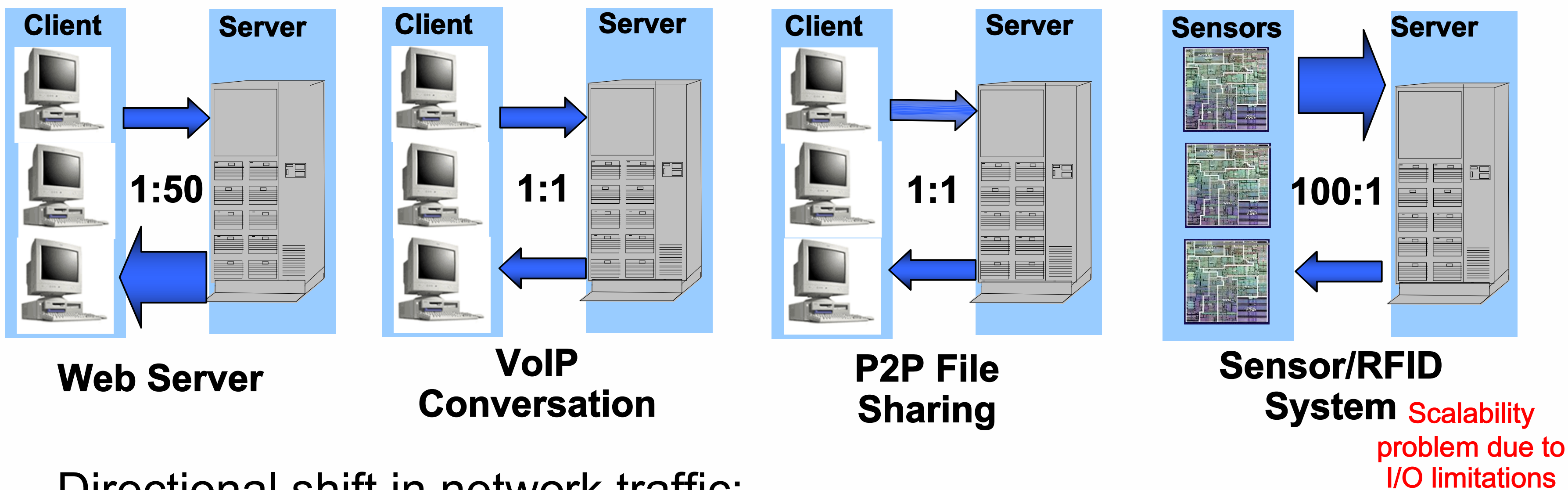
# Converged System Perspective



# Network Impact

***The massive deployment of smart, networked sensors will dramatically affect network volume and traffic patterns***




Directional shift in network traffic:

- Traditionally, client requests accommodated by caching
- In future, computation may be expected to move to the edge of the network to aggregate, synthesize and filter data
- Scalability issues

Source: IBM

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# Middleware Impact: Event Handling