

# IMS

## IP Multimedia Subsystem

*What is it, and what's it for?*

By Mike Riley, P.E.  
Mid-State Consultants, Inc.

# IMS is:

(The technical definition)

**IP Multimedia Subsystem (IMS)** is an architectural framework for delivering IP-based multimedia services. IMS is an open standards-based, real-time, service oriented architecture that lets service providers create systems from standard, IT building blocks.

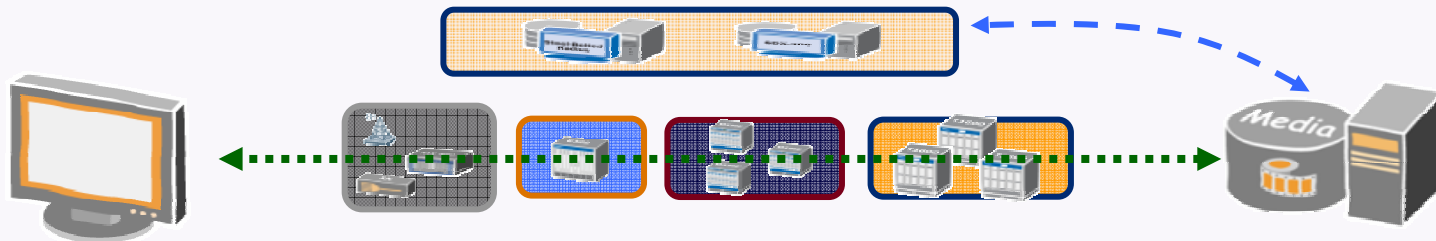
# In other words, IMS is:

1. A method to coordinate and deliver services across platforms  
The service is independent of the network.  
[Roughly similar to how the Java programming language works on essentially any operating system.]
2. A system and procedure more than a protocol suite?  
IMS defines how service requests are routed, how charging is performed, and how the service is enabled.
3. A framework for control – and billing.
4. *One more grand vision that won't really happen?*

# IMS is not:

A replacement for your basic network electronics  
or protocols

*although it may speed up your decisions to  
replace some of your equipment and protocols  
and control methods ...*



# Why IMS?

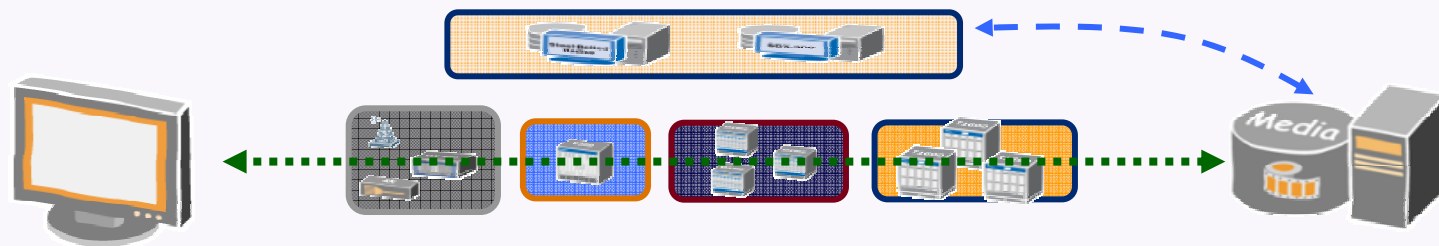
- A common control and application layer, access-aware, means the service can automatically adapt to the capabilities of the network and end device.
- One customer database.
- One billing system(?)
- The application can have the same ‘look and feel’ across networks.

# So... What's the point for a telco?

In comparison to AIN and existing options, IMS gives choices back to the service provider:

“Service providers... can now hunt for best-of-breed network elements ... and not be at the mercy of [a switch vendor.]”

Osman Duman, SVP and CMO of Utilicom



# History

IMS was originally designed by the wireless standards body 3rd Generation Partnership Project (3GPP), and was part of a vision for evolving mobile networks beyond GSM.

Its original formulation (3GPP R5) represented an approach to delivering "Internet services" over GPRS. This vision was later updated by 3GPP, 3GPP2 and TISPAN and requires support for other networks.

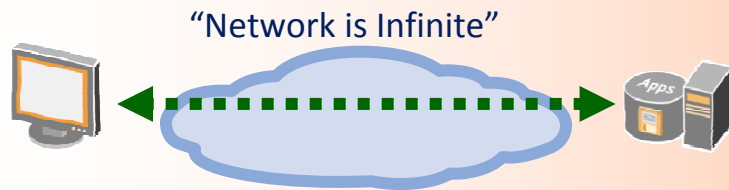
# Quotes

- “By decoupling and modularizing everything... re-using network resources ... and controlling the whole shebang with software ... network operators and even third party developers adopting IMS should both easily and quickly be able to hatch as many new services as they can possibly think up, then try them on their customers.”
- “one has to pay a lot to achieve simplicity.”

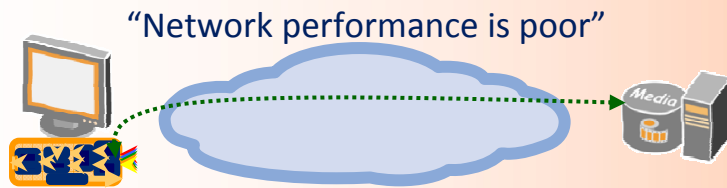
“The Further Adventures of IMS,” by Richard “Zippy” Grigonis, Internet Telephony, March 2008, p.62

# What about the Network itself?

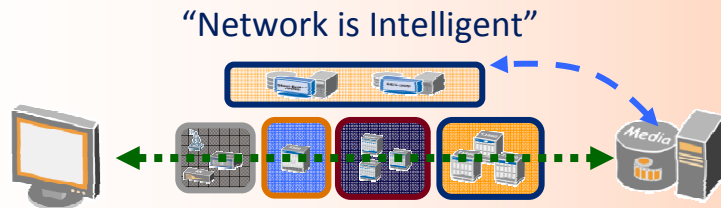
## The network point of view for IMS



- If the Bandwidth is infinite:
- The application has full bandwidth and the user experience will be perfect
- Synchronization + collaboration are unnecessary



- If network performance is poor (or bandwidth is limited):
- Buffer via a hard drive at the user location?
- Quality is assured locally, via dedicated control software



- If the network is intelligent:
- IMS makes a special request of the network for the application
- The user's experience for the application is assured via the IMS transaction

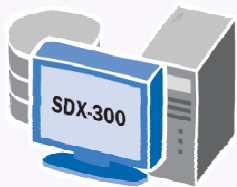
Slide elements and idea originally created by Juniper Networks. Used with permission.

# An Intelligent Network needs more info

Especially to deliver services across more than one network



AAA



Policy Server

- Need to know to whom you are delivering a service
  - If it is an external application, need to agree on “who” the user is.
- Need to know “what” service you are delivering
  - The application can vary per user (subscription, profile, request).
- Goal is to create a real-time SLA between the application and the user – “when”
  - Requires signaling to allow for feedback.

# IMS Architecture Model

A layered architectural framework for  
an intelligent network  
delivering IP multimedia services.

**Application Layer  
(or service layer)**

**Session Layer  
(or Control Layer)**

**Transport Layer**

**Application Layer:** Made up of  
content or application servers

**Session /Control Layer:** Manages  
call (or session) set-up,  
modification and billing

**Transport Layer:** The routers,  
switches and access elements

# The Layers in your network

- The Transport Layer – your existing network(?) and any network that can connect to the control layer and the service layer (IP via DSL, FTTP, cellular, other wireless, etc).
- The Control Layer – sort of like SIP + SS7(?) Controls (and bills) for connecting the network to the subscriber and to applications.

# The Application Layer

- For an example of why the IMS application layer would be a benefit, how many servers are attached to your soft switch? How many element management systems? In theory, if the applications were IMS-enabled you would only need one management system (and might be able to use ‘virtual’ servers).

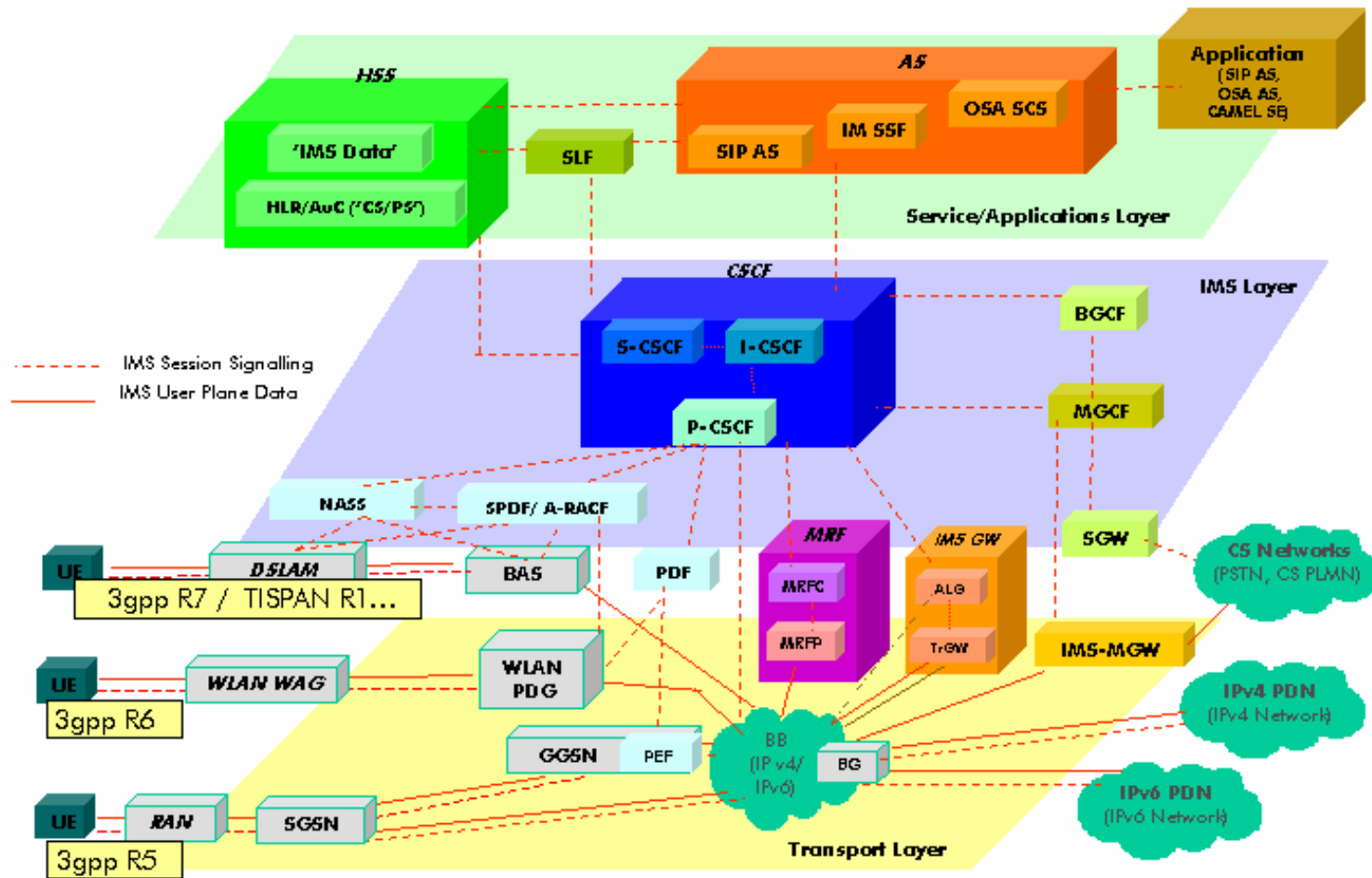
# One More Point of View...

- IMS will transform the service provider's business model from being connection-based, where the emphasis is on delivering a complete vertical service to a device, to a model that is subscriber-based, where services are delivered to a subscriber on any device or access type. This allows the service provider to compete on services, not price.
- Applications have the same look and feel regardless of how they are connected to the network.

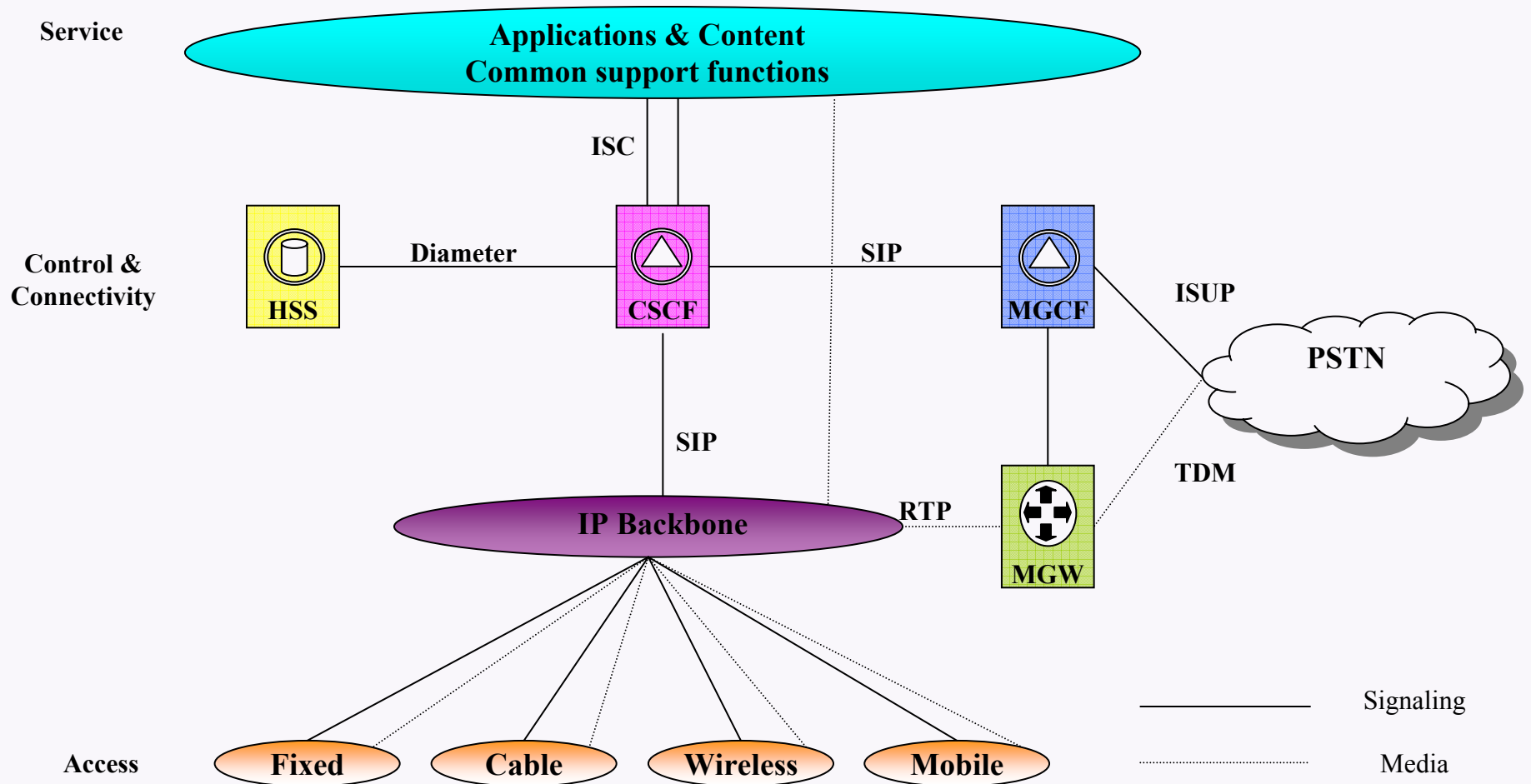
From a Nortel Networks IMS whitepaper

# THE TECHNICAL PART

Just Kidding!



# THE REALLY TECHNICAL PART



# Definitions

- CSCF = Call Session Control Function
  - CSCF provides session control for terminals and applications using the IMS network. This includes routing of SIP messages, monitoring of SIP sessions, and communicating with policy architecture for authorization.
- IMS applications are executed in SIP application server(s). Apps from separate servers can be combined into a unified service.

- HSS = Home Subscription Server
  - or User Profile Server Function (UPSF), is a master user database that contains the subscription-related information (user profiles), performs authentication and authorization of the user, and can provide information about the user's physical location. It is similar to the GSM Home Location Register.
  - DIAMETER is the protocol for AAA (Accounting, Authentication, Authorization). Developed from RADIUS (Remote Authentication Dial In User Service) protocol.

- S-CSCF = “Serving” CSCF
  - A stateful SIP server
  - The central node of the signaling plane. It is a SIP server, but performs session control too. It is always located in the home network. It uses Diameter Cx and Dx interfaces to the HSS to download and upload user profiles — it has no local storage of the user. All necessary information is loaded from the HSS.
- I-CSCF = “Interrogation” CSCF
  - Finds the appropriate S-CSCF

- P-CSCF = “Proxy” CSCF

- Access network entry point. Sits on the path of all signaling messages, establishes an IPsec security association, may include a Policy Decision Function (PDF generates charging records).

- An SBC (Session Border Controller) can implement the P-CSCF and policy enforcement. An SBC can manage IMS sessions to ensure security, QoS, SLAs, and NAT / Firewall transversal for real time streams.

- MGCF = Media Gateway Control Function
  - Controls traffic between networks, especially between TDM & IP. Interacts with SIP for call and session control.
  - An MG (Media Gateway) provides the actual interface including RTP / UDP / IP to TDM and transcoding.
- BGCF = Breakout Gateway Control Function
  - Determines how to route to the PSTN.

# Examples:

## NEC uses IMS for Video

...Japanese vendor NEC announced the launch of its IPTV business... [which] targets carriers using an IMS architecture.

“... our direction is to see IPTV services placed on top of IMS core networks ... to give them some flexibility and also some strong features.”

“NEC brings IPTV over IMS,” by Sarah Reedy, Telephony Online, Mar 11, 2008.

# Vendor / Service Examples

- The Convergence Session Manager is an SBC (session border controller) that combines traditional SBC functionality with security, management and control capability for VoIP and other real-time services.

“The softswitch is really an application delivery platform for delivering and controlling voice.”

Ken Kuenzel, Convergence CTO and VP of Engineering

# Covergence, Inc. Session Manager

Simplifies Voice and Drives Down Costs

It enables the enterprise to:

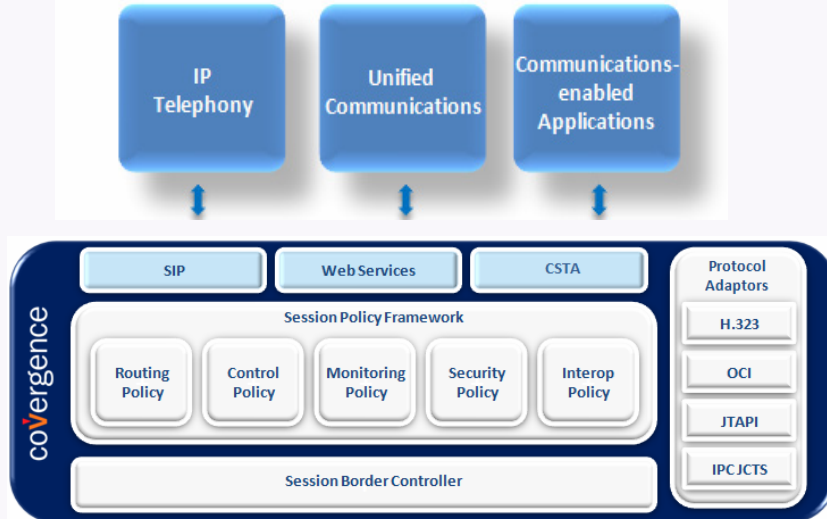
**Consolidate Applications:** There are too many platforms doing fundamentally the same thing. Voice applications become network services accessible to any authorized user or application

**Provide Common Routing Policy:** Moves the application routing into a common SOA-based infrastructure. Currently routing is controlled by each application which is hard to manage and expensive to resource.

**Provide a Common Policy Framework:** Apply the correct policy and controls across real-time applications to ensure compliance with security, regulatory and business requirements.

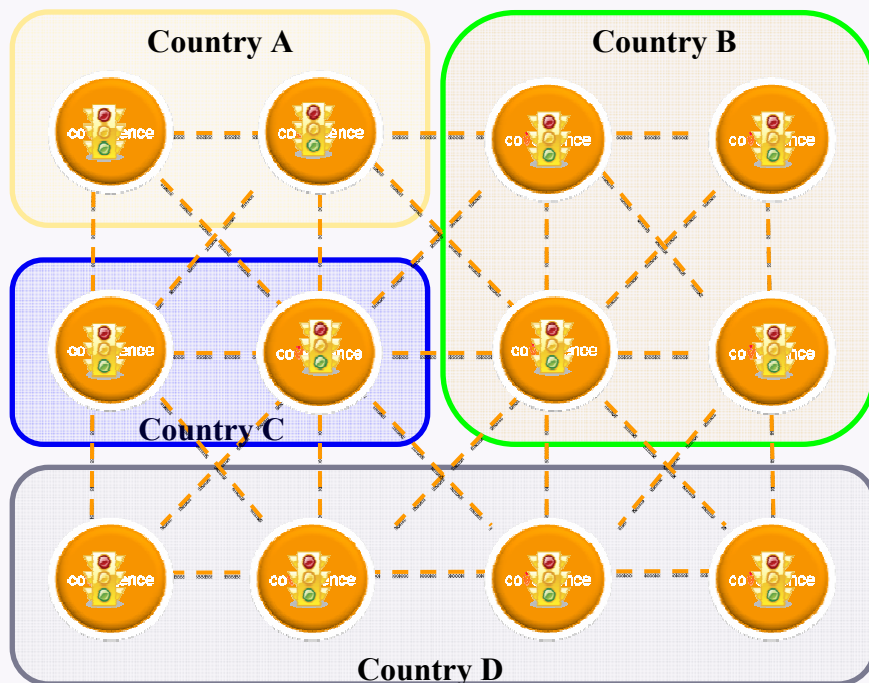
**Integrate Traffic onto the WAN:** Drive OPEX cost down by using the internal network where possible to achieve least cost routing and trunk via IP with traditional carriers when needed.

**Integrate Voice into Applications:** Leverage the voice infrastructure by connecting productivity applications directly to the network.



# Covergence Uniform Policy Enforcement

## Global Company ABC



**Covergence Policy Enforcement Point**

### Security Policy

- Is this session allowed on the network?
- Does this session require unique security treatment?

### Routing Policy

- Is my network performing optimally?
- Are outbound calls being routed over least cost routes?

### Control Policy

- Am I delivering the required quality to meet the SLAs?
- Is this session entitled to use the requested service?

### Monitoring Policy

- Are we capturing the information for traffic engineering?
- Are we in compliance with our regulatory requirements?

### Interoperability Policy

- Is protocol repair required for this session?
- Is presence mapping required for this session?

## Another existing application

Embarq used the [NewStep Networks Converged Services Node] to ... enable users to have a single phone number for numerous phones and services... and easily switch calls from wireless to WiFi.

“The Further Adventures of IMS,” by Richard “Zippy” Grigonis, Internet Telephony, March 2008, p.62

# Migration and Recommendations

- Deploy new (IMS-based) hardware for new services?
- Slowly migrate away from your existing hardware, or insert mediation devices.

“As [the carriers] embark on their IMS migrations, there will be several paths open to them, including evolutions starting from the softswitch, signaling layer or service mediation...”

“State of the IMS Plugfest and Certification,” by Michael Khalilian, IMS Magazine, February 2008.

- No big cutover event
- No major forklift upgrades

# Alternatives?

- SIGTRAN uses the Stream Control Transmission Protocol (SCTP) to provide the same application and call management paradigms as SS7, over IP networks.
- SOA (Service Oriented Architecture) and SaaS (Software as a Service) could capture a lot of subscribers without specific IMS compatibility, *but the applications should ultimately fit into IMS-enabled networks.*

Remember:  
“IMS comes from a standards  
body, and IMS is here to help.”

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