



Wireless Data Billing

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Agenda

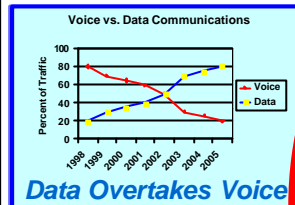
- **Market Dynamics and Billing Challenges**
- **Prepaid Solution Strategy and Differentiation**
- **RADIUS Access Control Model**
- **Prepaid Billing Call Flows**
- **Incumbent versus Next Generation Billing Systems**
- **Prepaid Roadmap**
- **Prepaid Architecture and Solution Comparisons**
- **Content Services Gateway (CSG)**

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Market Dynamics



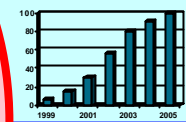
It is estimated that 50% of Voice traffic will originate On wireless networks by 2005
Chorleywood Consulting, 2001

Mobile Outpaces Fixed Communications

Drive for Value-Added Data Services

Internet Usage Explodes

Millions of Users Worldwide



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Billing Challenges

- Time and distance have no correlation in the data environment
Network is "always on" and billing for duration would discourage usage of the network
- To properly value new Internet services, measurements need to be correlated based on packet volume, service value, application type, QoS, TOD or value of the retail purchase
Creates a complex billing model and accounting mechanisms
- Prepaid billing needs to be done in real-time although length of session is not known in advance

Billing a phone call will be the biggest challenge for wireless telecom operators in the year ahead The problem is that no operator quite knows how to charge people for these services. Even worse, there is no one company to solve their difficulties.

Reuters, Lucas van Grinsven, European technology correspondent (December 11, 2000)

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Billing Models by Service Type

Service	Mobile Internet Access	Mobile Intranet/Extranet Access	Customized Infotainment	Multimedia Messaging Service	Location-based Services	Rich Voice
Airtime	X	X	X		X	X
Packet Volume	X	X	X	X	X	X
Message				X		
Subscription or Service Value	X	X	X	X	X	
Transaction						
Quality of Service	X	X	X	X	X	X
Time of Day	X	X	X	X	X	X
Retail Purchase Value	X		X			

Airtime

Packet Volume

Message

Subscription/Service Value

Transaction

Quality of Service

Time of Day

Retail Purchase Value

Billed by the duration of the session

Billed by number of packets downloaded

Billed by the number of messages retrieved or sent

Billed by prior agreement (Example is 30 Internet accesses per month for \$19.95)

Billed by access or use of the service

Billed by the Service Level Agreement on the level of service delivered

Billed by the time of the day that the service is delivered (Peak vs. Off-Peak Hours)

Billed by the value of the item purchased during the session

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Combining Measurements

- **Billing record may include**

Charges for number of bytes downloaded

AND

Access to Service

- **Example: Video Feed**

Number of bytes downloaded = 2MB @ \$.01 per KB

Value of video as premium services = \$8

Total = \$20 + \$8

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Prepaid Solution Strategy

- ***Truly “Data”***

Measurements based on data volume and content

Not based on circuit-switched connections

IP transport throughout the network

Credit balance comes from platform external to SCP

Based on RADIUS access control model

- ***Truly Beneficial***

Operators can bill based on value of service vs. duration

→ Encourages usage

Complexity and limitations of circuit-switched architectures are bypassed

Truly real-time billing

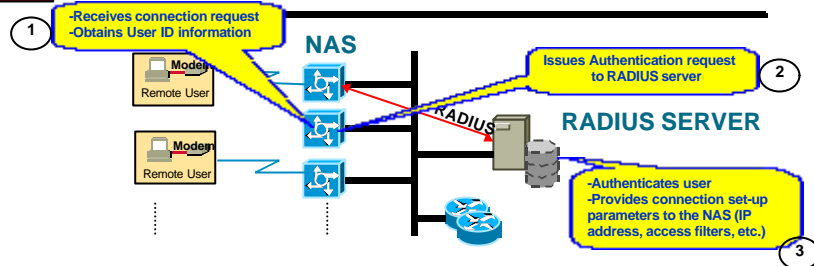
Interworks with legacy billing systems



Prepaid Solution Differentiators

- **Fast to market**
- **Based on same proven approach as VoIP Prepaid solution**
- **Real-time billing with no leakage**
- **Ability to bill for a variety of content**
- **Integrates Voice and Data balances**
- **Fully integrated and turn-key at the customer site**
- **Combines best HW and SW products from Cisco and our Ecosystem partners**
- **Cisco IOS features built into GGSN**

RADIUS Access Control Model



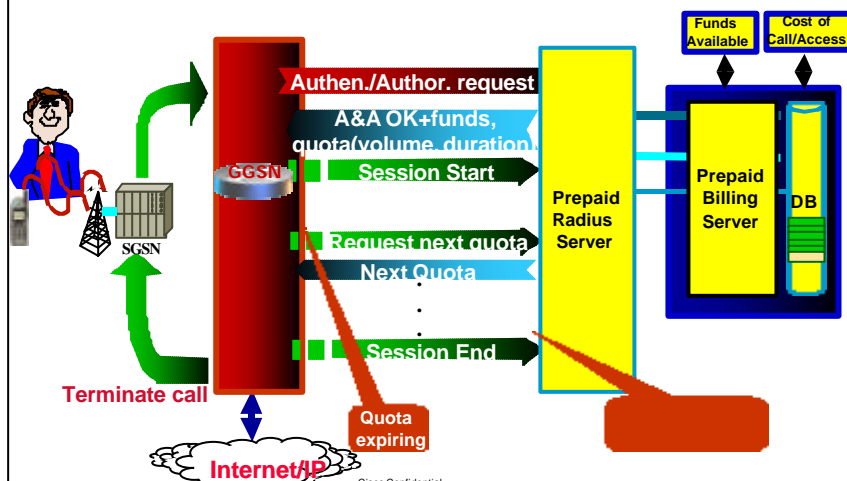
- Long established, widely adopted, broadly interoperable protocol established originally for access to remote computers
- RADIUS is the de-facto AAA protocol being used in the industry
- Exchanges attributes between RADIUS server and NAS to define or limit services of user
- Tremendous momentum in VoIP applications (9M VoIP users of RADIUS)
- Extremely effective for real-time authentication and authorization of users. Technology has matured to include accounting control; feeds back-end systems for billing, monitoring and reporting.
- Active role of RADIUS server provides accounting information immediately versus waiting for delivery from a switch to the CDR collection point.

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Radius Interface: Limit Call Flow



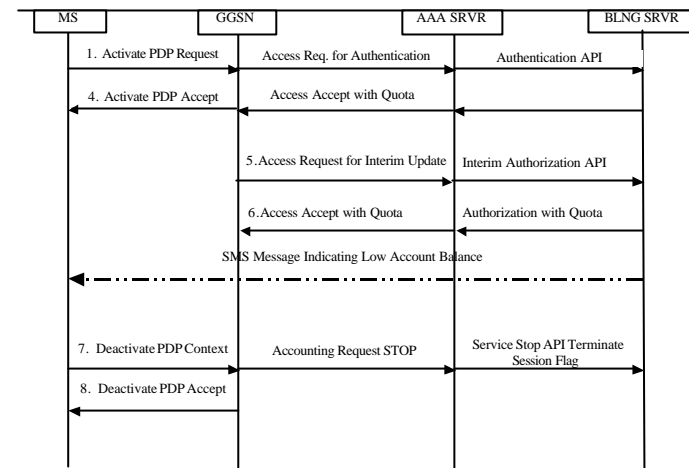
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NORMAL CALL FLOW IN GGSN ARCHITECTURE



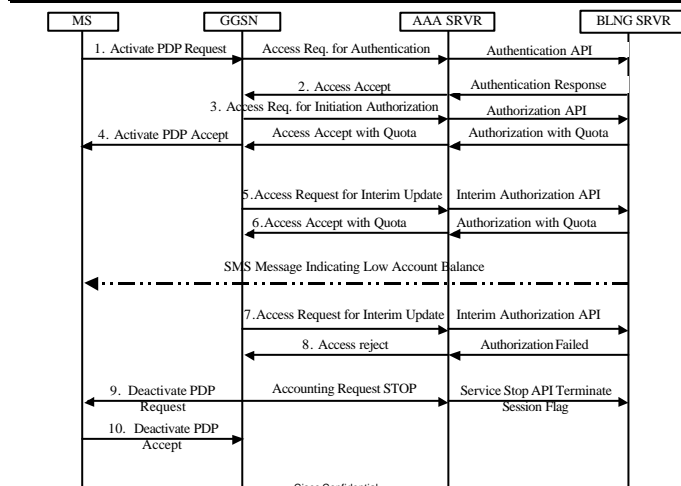
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FUNDS DEPLETION CALL FLOW FOR GGSN

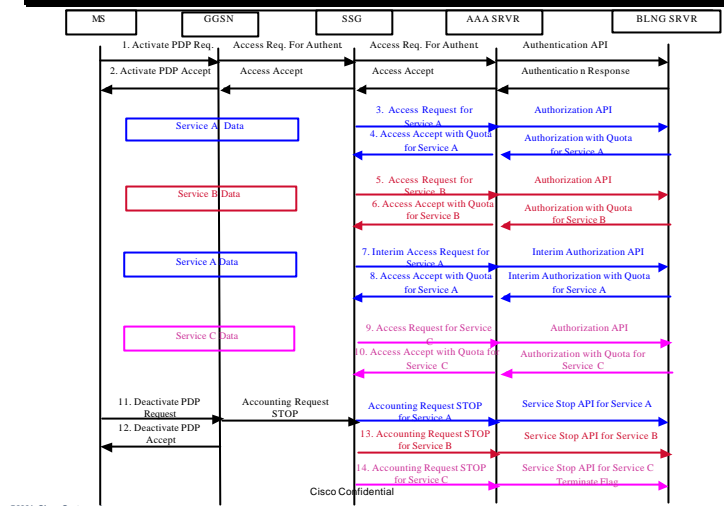


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NORMAL CALL FLOW IN SSG ARCHITECTURE



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Incumbent versus New Billing Systems

2G Billing Systems	2.5G+ Billing Systems
IN based: Intelligence is at core of network	IP based: Intelligence is distributed across boundaries of network
Based on authorization through the SCP	Based on RADIUS control models
Optimized to measure one application: Voice	Optimized to measure multiple data applications
Built to measure circuit-switched call flows	Built to measure packet-based session flows
Measure distance, duration and TOD	Measure duration, packet volume, service value application type, QoS, TOD
One source of call session information	Many sources of session data (RADIUS server, web servers, email servers, Netflow, etc.)
Aggregation of data not required	Aggregation of multiple data sources is required
Cannot view log files and disk space consumption from various applications	Can view log files and disk space consumption from various applications

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GPRS Prepaid Solution

- **Phase 1** **4Q, 2001** **Early Field Trial**
Real-time billing based on volume (time if operator insists)
Bill for multiple, simultaneous services with different rates
CDR collection
- **Phase 2** **2Q, 2002** **Early Field Trial**
On-line recharging
Content Billing/Retail capability for operator
- **Phase 3** **3Q, 2002** **Early Field Trial**
Roaming
- **Phase 4** **4Q, 2002** **Early Field Trial**
Advance credit checking
One bill for multiple accounts

NOTE: The capability to integrate incumbent voice billing systems with this billing system exists from Phase 1. This can be done with the assistance of a Systems Integrator if the Service Provider chooses.

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Phase 1 Architecture

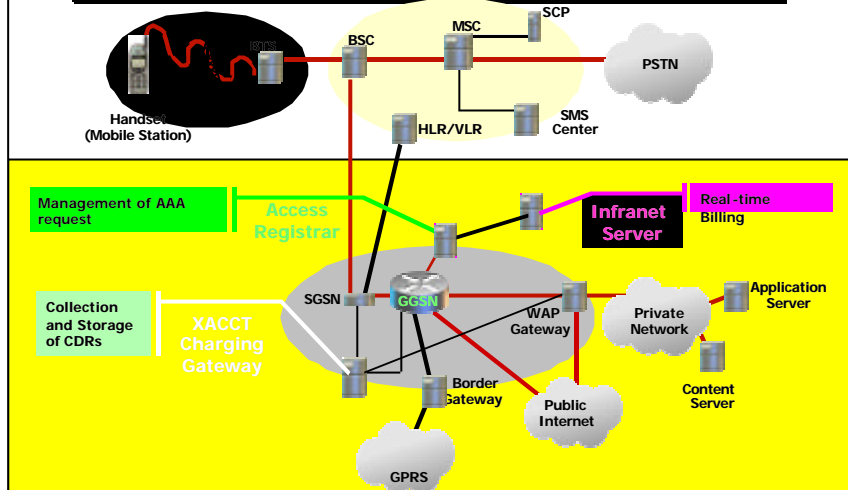
- **Cisco GGSN**
- **Cisco Service Selection Gateway**
- **Cisco Access Registrar**
- **Portal Infranet Platform**
- **XACCT Charging Gateway**

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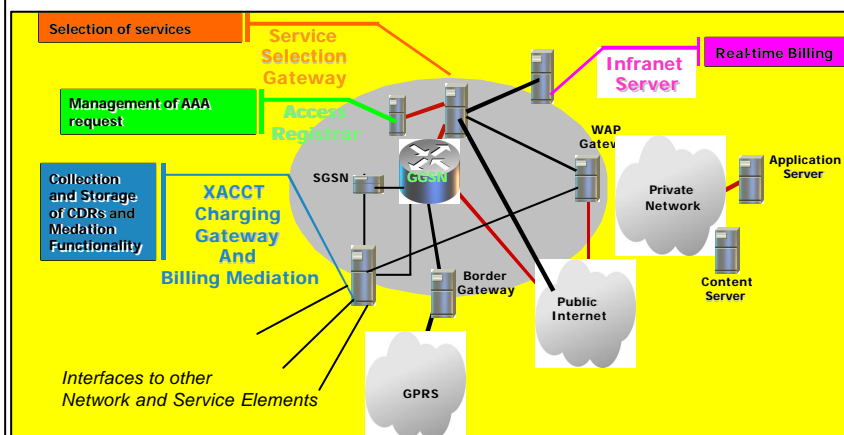
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GGSN Solution Architecture



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SSG Solution Architecture



Note: Architecture to converge Prepaid Voice and Prepaid Data to be determined
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Solution Comparison

	GGSN ONLY SOLUTION	SSG SOLUTION
Components of Solution	Cisco GGSN Cisco Access Registrar Portal Infranet Billing Platform XACCT Charging Gateway XACCTmobile	Cisco or Competitor's GGSN Service Selection Gateway (SSG) Cisco Access Registrar Portal Infranet Billing Platform
Features included in Phase 1	Real-time rating and accounting Measurement flexibility based on volume (bytes) or time Capability to measure usage as multiple services are used simultaneously. Different billing rates can be applied across each service. Capability to collect CDRs on XACCT Charging Gateway Capability to integrate Voice and Data Prepaid balances.	Real-time rating and accounting Measurement flexibility based on volume (bytes) or time Capability to measure usage as multiple services are used simultaneously. Different billing rates can be applied across each service. Capability to collect CDRs on XACCT Charging Gateway Capability to integrate Voice and Data Prepaid balances. Can be used with competitor's GGSNs, enabling us to offer Prepaid services into competitor's accounts. Can be used in MVNO or MISP accounts where there are no GGSNs, enabling us to offer Prepaid services into these accounts.

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Solution Comparison

	GGSN ONLY SOLUTION	SSG SOLUTION
Additional features included in Phase 2	Content-based billing which is capability to measure usage based on application type, level of service, location, retail purchase, etc. Incorporation of XACCT mediation functionality.	Content-based billing which is capability to measure usage based on application type, level of service, location, retail purchase, etc. Incorporation of XACCT mediation functionality. In addition, the SSG has functionality that enables enhanced content- Capability to re-charge user's credit balance on-line i.e. during a data session.

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Solution Comparison

	GGSN ONLY SOLUTION	SSG SOLUTION
Additional features included in Phase 3	Prepaid billing while roaming	Prepaid billing while roaming
Additional features included in Phase 4	Advance credit checking One bill for multiple accounts	Advance credit checking One bill for multiple accounts

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Summary Prepaid Billing

- Billing is the operator's biggest challenge today
- IP-based Billing meets the challenges of next generation wireless networks
- RADIUS-based AAA methodology sets foundation
- IP mediation performs detailed data collection and aggregation from multiple vendors; required for content-based billing
- Total solution delivers all capabilities required for success in these markets

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Content Services Gateway

Content-based Billing

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Content Services

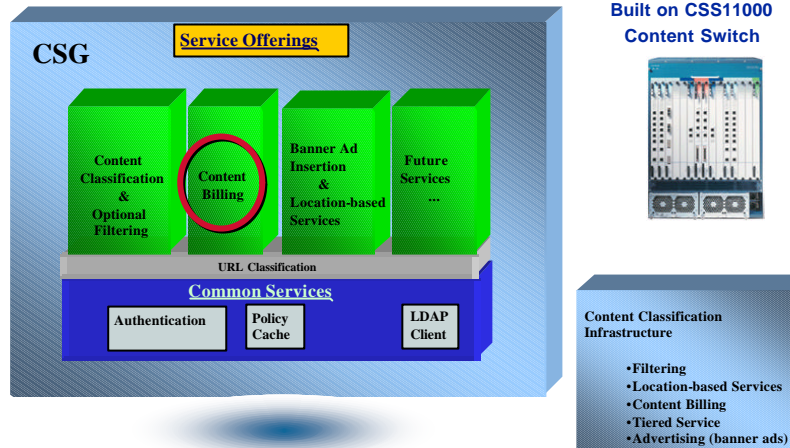
- **Examines the datastream to make decisions**
 - This is data beyond the IP and TCP/UDP headers
 - Example: Content Billing
 - CSS11000 provides optimized hardware for Content Services
- **Provides finer granularity**
 - Can determine device type in HTTP
 - Can determine directories and files being accessed in HTTP
 - Can bind related connections in FTP, RealAudio, etc

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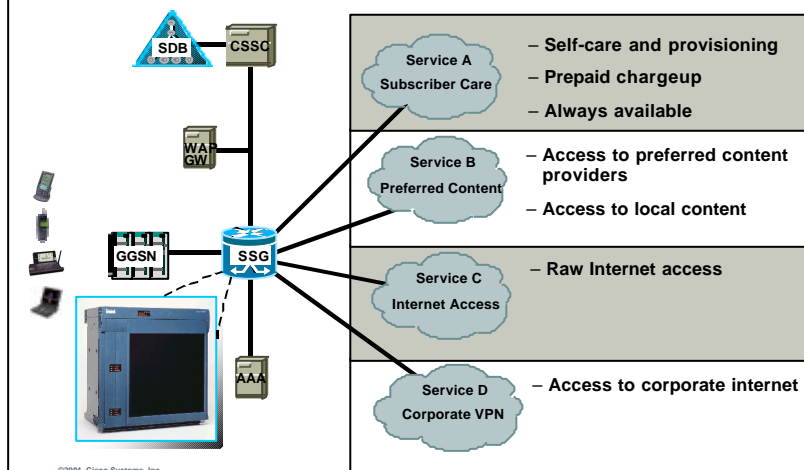
Content Services Gateway a General Services Platform



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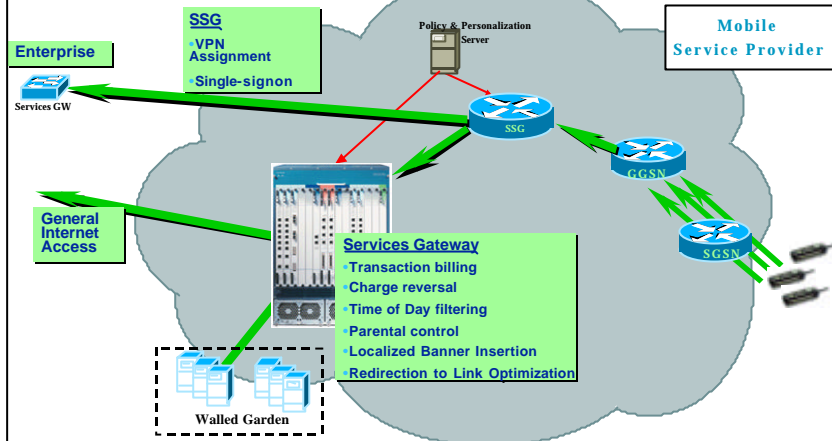
Service Selection Gateway Service Examples



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Content Services Gateway Synergies with SSG

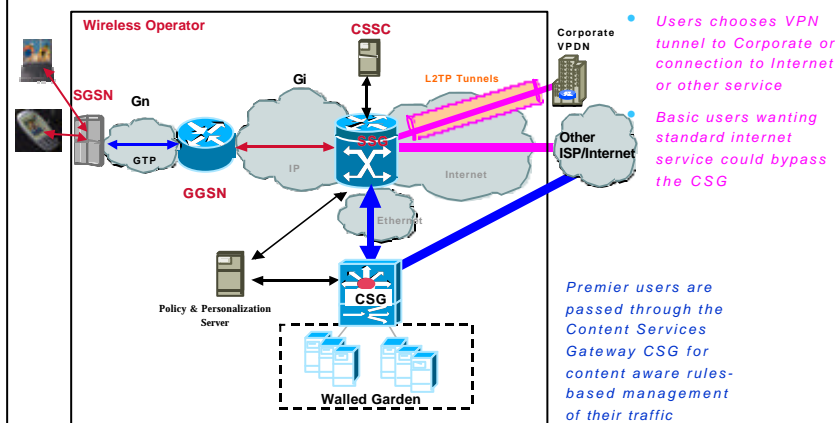


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Content Services Gateway



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SSG Differential Billing

Service. 1

SSG

www.Cisco.com

3000 Packets

3000 Packets

X \$0.00017 per pkt

= \$0.51

Service. 2

SSG

www.restaurant.com

3000 Packets

2000 Packets

X \$0.00015 per pkt

= \$0.30

Rules Based Mediation to determine what actually gets billed to the customer

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SSG / CSG Billing

SSG (Source Select Gateway) and **CSG** (Content Select Gateway) are shown at the top.

Accesses by John Smith (Destination):

- 350 Packets (from `www.amazon.com/index.htm`)
- 600 Packets (from `www.buyit.com/banners/`)
- 2000 Packets (from `www.amazon.com/music/modern/rap/rap1.mp3`)

Rules Based Mediation (Central Processing):

Rules:

- John Smith
- pref. download: .0025
- Music.com corporate rates
- General transport: .00013
- Downloads: .004**
- Buyit.com corporate rates
- Ad Insertion: .02**

Mediation Results:

- 350 packets of general browsing => included in basic access
- 600 packets for banners => charge to buyitcom
- 2000 packets for download of preferred content => bill at download rate

Accounting records applicable to Data Mining as well (Callout box pointing to the Rules section)

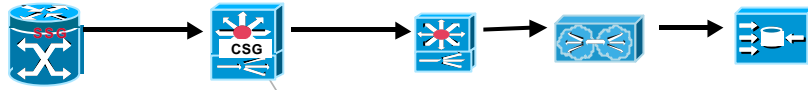
Billable items for this transaction

Customer: John Smith	
•Download ...rap1.mp3:	$\$.004 \times 2000 = -\8.00
•Customer: Buyit.com	
•Advertising:	$\$.02 \times 600 = -12.00$

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Content-based Billing

Cisco SSG	Cisco CSG	Mediation Platform	Rating Server	Billing Server
www.amazon.com	www.amazon.com/index.html	350 bytes of general browsing	Included in basic access fee of \$10 per month	No additional charge for browsing to user
www.buyit.com	www.buyit.com/banners/	600 bytes of advertising banners	Advertising rate of \$.02 per byte	\$.02 x 600 = \$12 billed to buyit.com
www.amazon.com	www.amazon.com/music/modern/rap/rap2.mp3	2000 bytes of music downloaded by user	MP3 download rate of \$.004 per byte	\$.004 x 2000 = \$8 billed to user

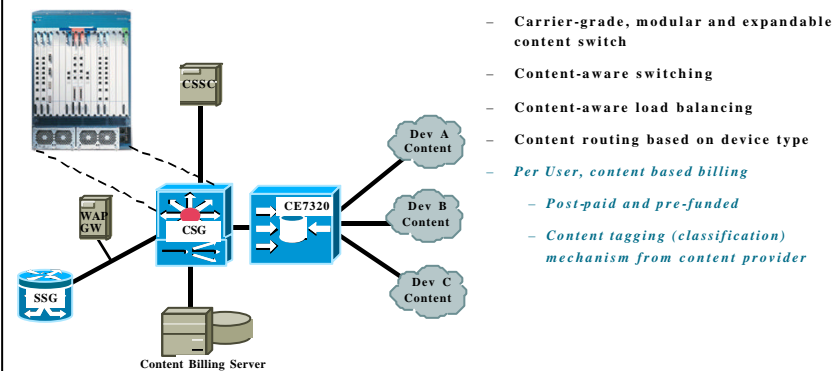


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Content Services Gateway Upgrade Path for CSS 11K

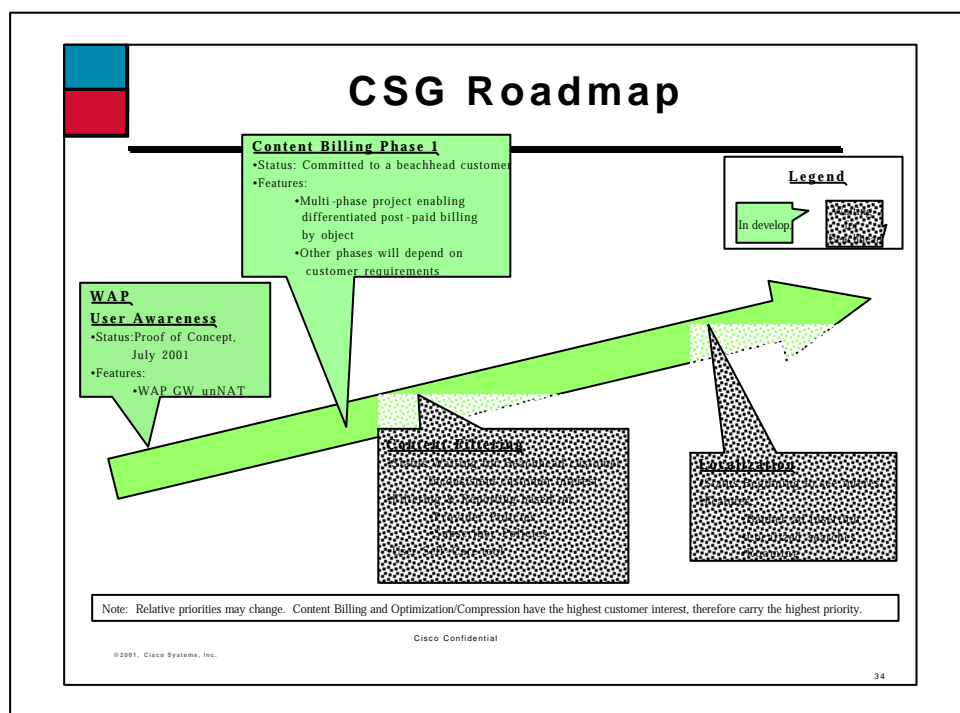
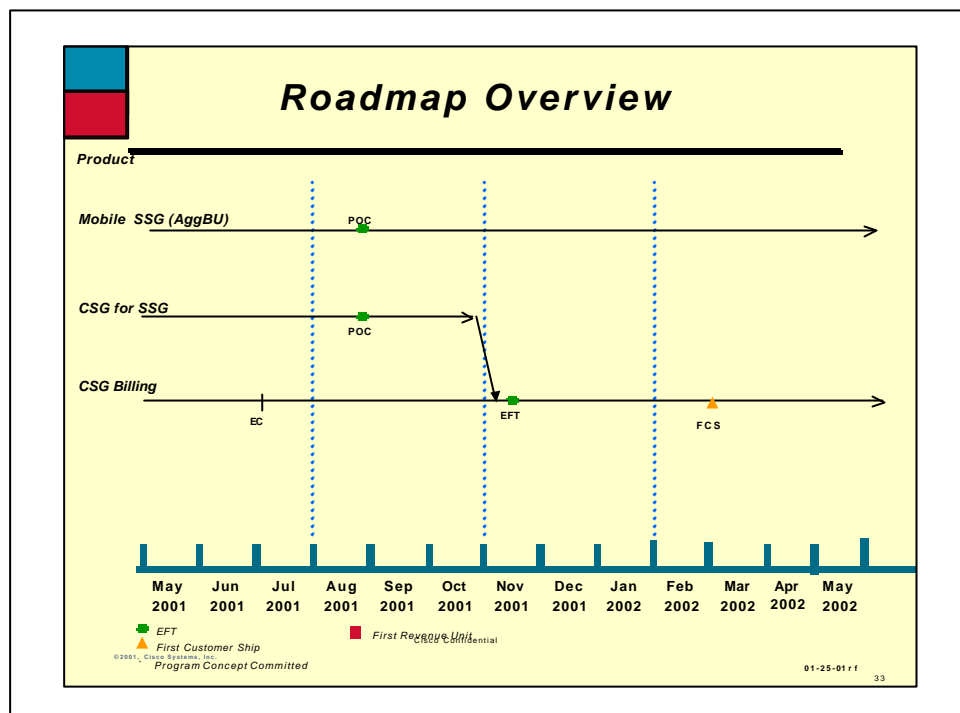


- Carrier-grade, modular and expandable content switch
- Content-aware switching
- Content-aware load balancing
- Content routing based on device type
- *Per User, content based billing*
 - *Post-paid and pre-funded*
 - *Content tagging (classification) mechanism from content provider*

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Features and Benefits

Mobile Wireless Billing solutions position Cisco, with our Ecosystem partners, as leaders in enabling revenue assurance for the mobile IP environment.

Solution/ Product	Feature	Benefit
GGSN and SSG	Real-time rating	No revenue "leakage"
	Service selection and rating	Use of multiple, simultaneous mobile data services
	Measurements based on time, volume, application, QoS, etc	Billing is based on usage and creates greater operator revenues
	RADIUS control model	Billing not tied to IN circuit switched models
Content Services Gateway	Transactional billing	Content aware rules-based management of operator traffic

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Any Questions?

THANK YOU!

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