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COMMUNICATIONS

Customer Advisory Board Annual Meeting

Voice over LTE, VoWiFi, and WebRTC Solutions Workshop

Rob Holt – Senior Director, Product Management
Chris Berluti – Director - Technical Product Management
October 4 - 5, 2016
Paris, France

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In this session…

We look to discuss :

- Oracle Communications IMS infrastructure for launching services such as VoLTE, VoWiFi and WebRTC
- NFV Ready program
- Network Agility Importance
- Design, Development and Launching a Service

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Program Agenda

Oracle Communications Solution Pillars

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VoLTE, VoWiFi, and WebRTC

Oracle Portfolio Solution

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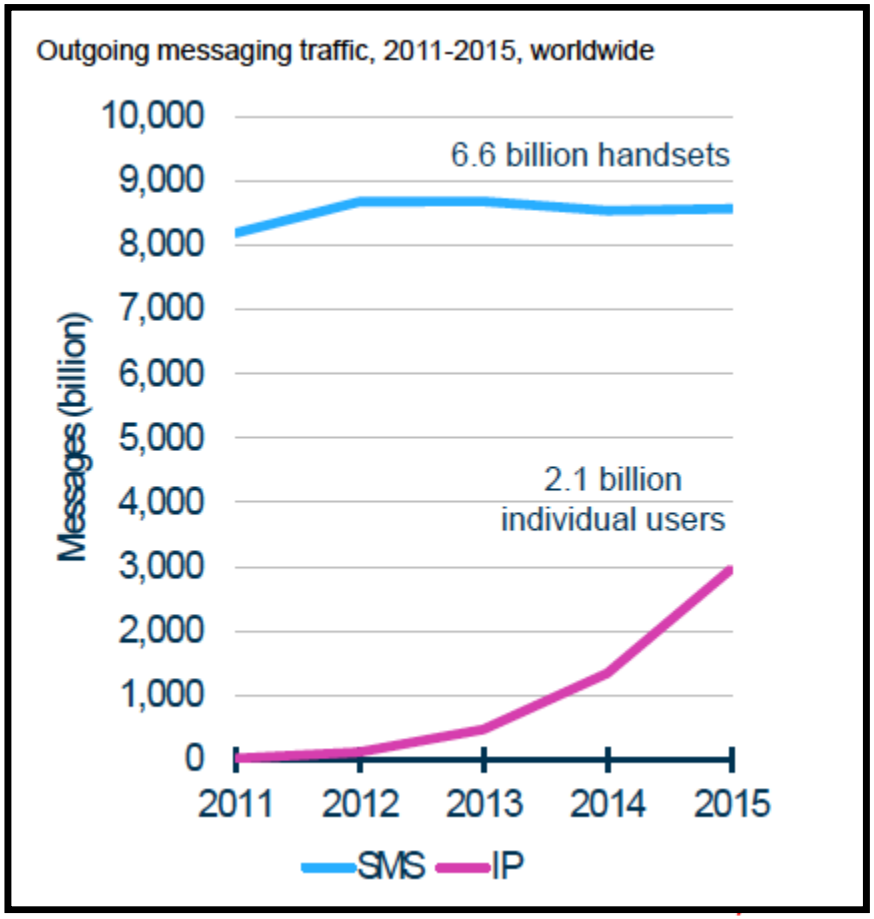
The IP-Communications services market is getting very crowed

Service	Monthly active users
WhatsApp	1 billion (Feb 16)
FB Messenger	900m (Apr 16)
WeChat	697m (Dec 15)
Skype	299m (Jun 13)
Kik Messenger	275m[1] (Feb 16)
Viber	249m (Apr 15)
LINE	212m (Sep 15)
SnapChat	200m (Jul 15)
Hike	100m (Jan 16)
KakaoTalk	39m (Jun 15)



Analysis Mason
IMS World Forum 2016
Amsterdam

All the new players have their limitations …

- OTTs are at the mercy of government regulators
- Separate application downloads and registration processes deter some users
- VoIP services may perform very poorly under heavy network loading
- Some of the best and most feature rich applications are limited to specific operating systems

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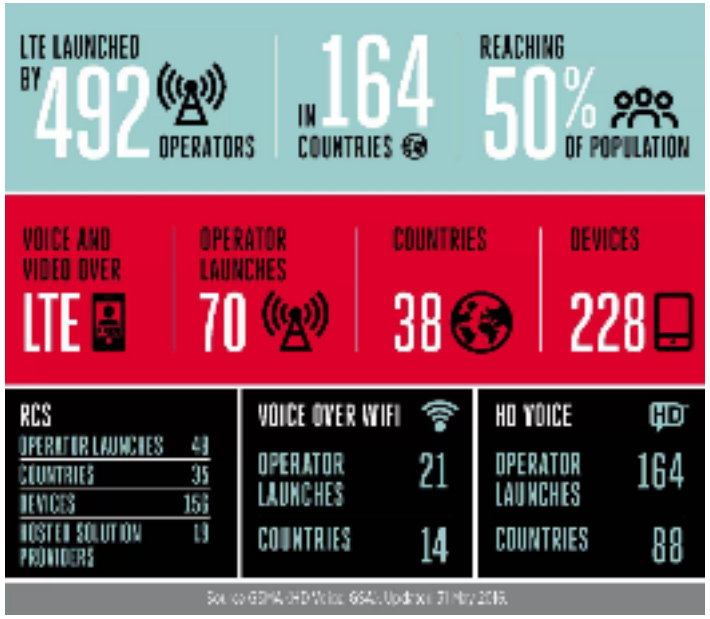
Solid VoLTE & VoWiFi Rollouts to date

T-Mobile

VodafoneUK



Source: GSMA Scorecard June 2016

Sprint

at&t

verizon

China unicom中国联通

ROGERS

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Voice CX Enhancement and Modernization

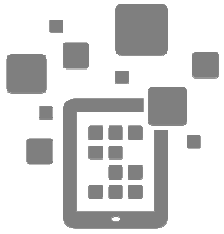
VoLTE Key Business Drivers

2X Call connection times are twice as fast as the current methods

= Opportunity for contextualized identification

Voice calls are delivered over 4G LTE networks with superior HD quality

Enables interoperability between all CSP VoLTE offerings



Allows a new era of multimedia communications services to be launched

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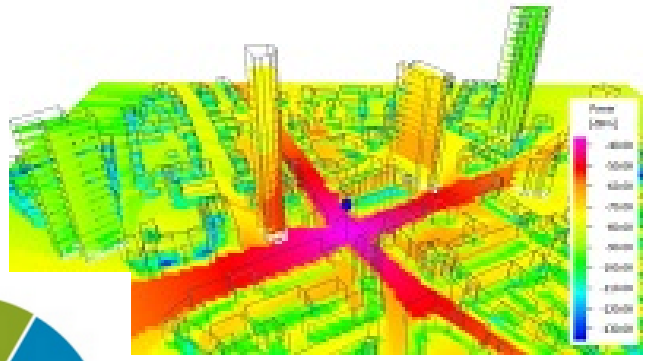
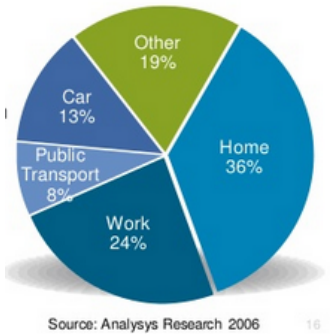
Indoor Coverage particularly challenging for LTE

Most mobile device use is from home, but indoor coverage is not aligned…





Source: Analysys Research 2006

.. and Leads to Subscriber Churn

"Poor home coverage is a leading cause of subscriber churn. With Wi-Fi Calling, T-Mobile has seen a significant reduction in churn due to coverage. So much so over the last 5 years that we have continued to invest heavily in Wi-Fi Calling."

Josh Lonn - Senior Director, Communication Services
T-Mobile

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WiFi Calling – A ‘no-brainer’ for in-door coverage

Cost-effective solutions to complement macro coverage and capacity …	.. by reducing the TCO, by avoiding additional spectrum, towers and backhaul,..	.. and customer satisfaction and top-line.
Wi-Fi Calling	Using any WiFi Access network connected the Internet for voice and messaging.	• Customer retention due to reduced call drops. • ‘Take-back’ from roaming alternatives (OTT) • **Voice calls on non-SIM devices**
Wi-Fi Offload	Using managed WiFi Access network connected the Internet for data traffic	Customer retention as data roaming services can be expensive
Small Cell (LTE, LTE-U, 5G)	Using any femto Access Point connected the Internet	Improved customer satisfaction with reduced call drops

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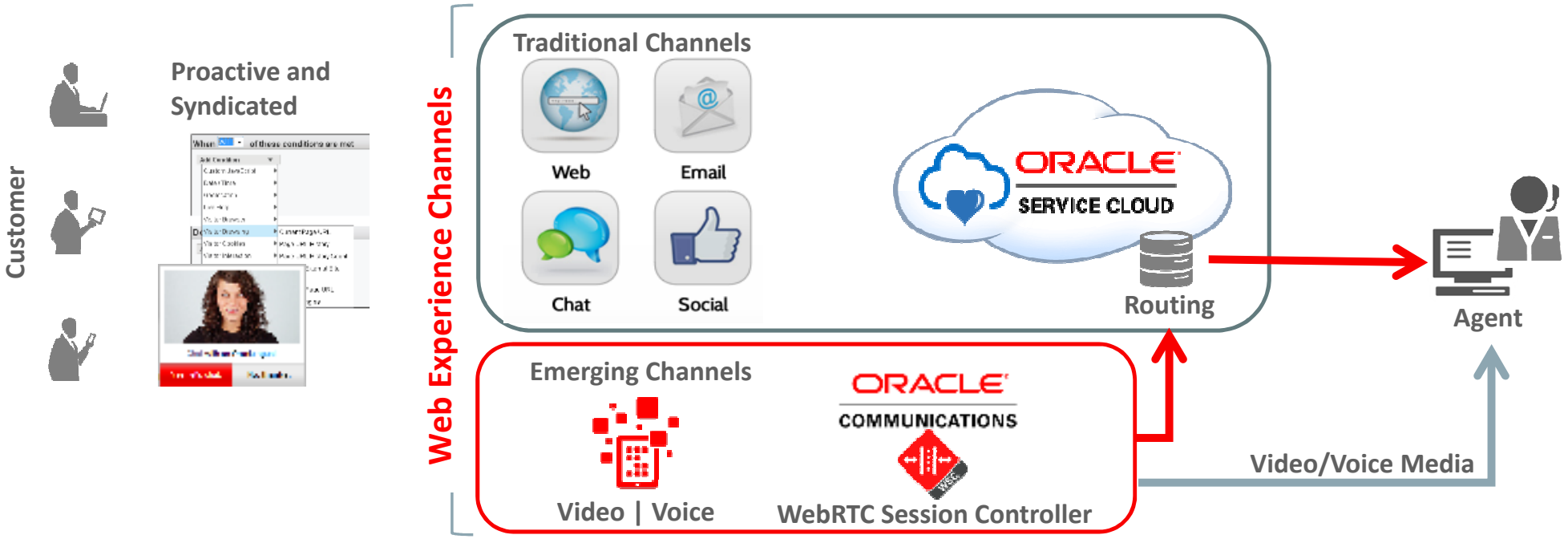
Enhancing Customer Service via WebRTC Example

Oracle Service Cloud + Oracle WebRTC-powered video chat example



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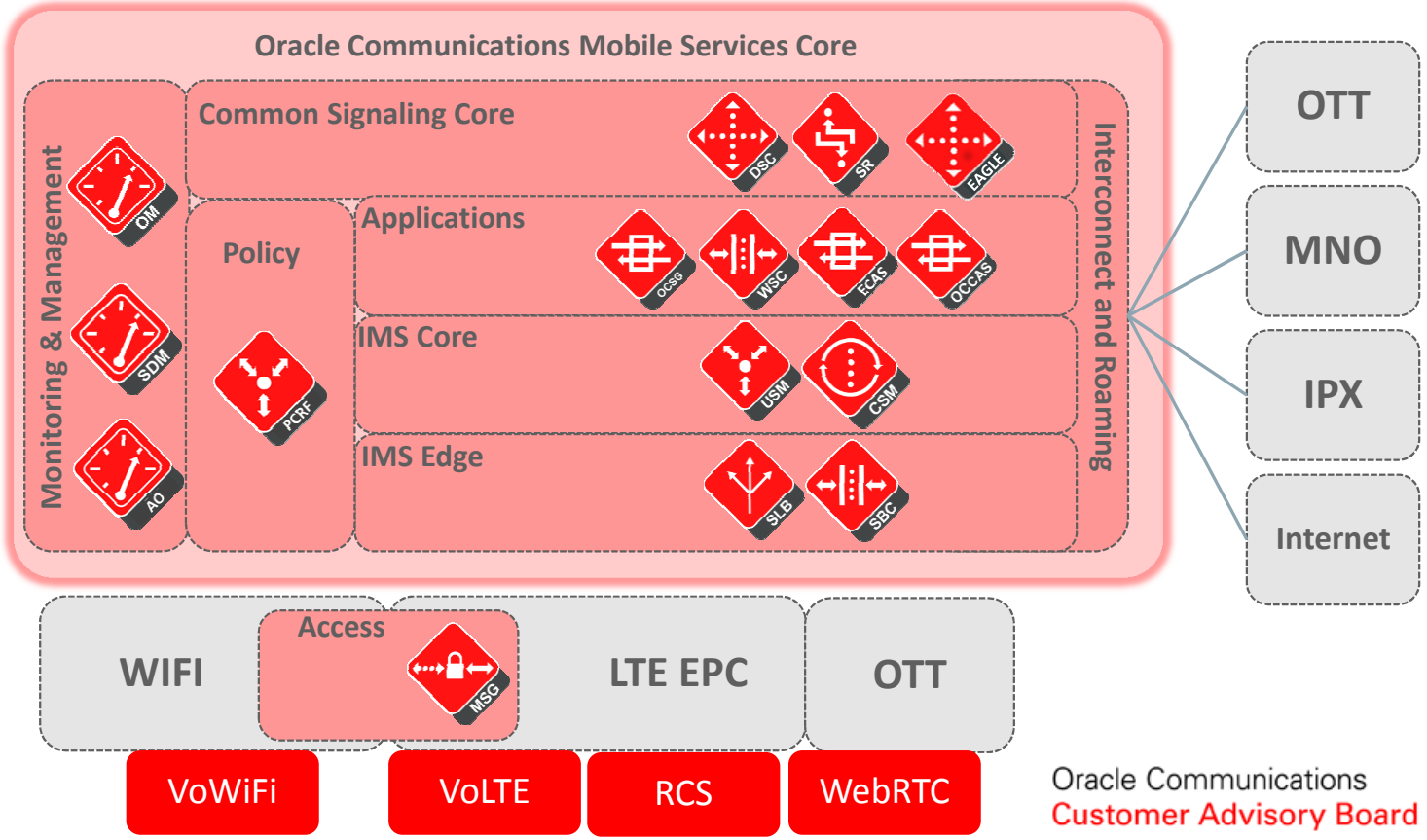
Oracle Communications Mobile Services Core

Benefits

- Converged
- Consolidated
- Standards-based
- Multi-Services Platform
- NFV-enabled



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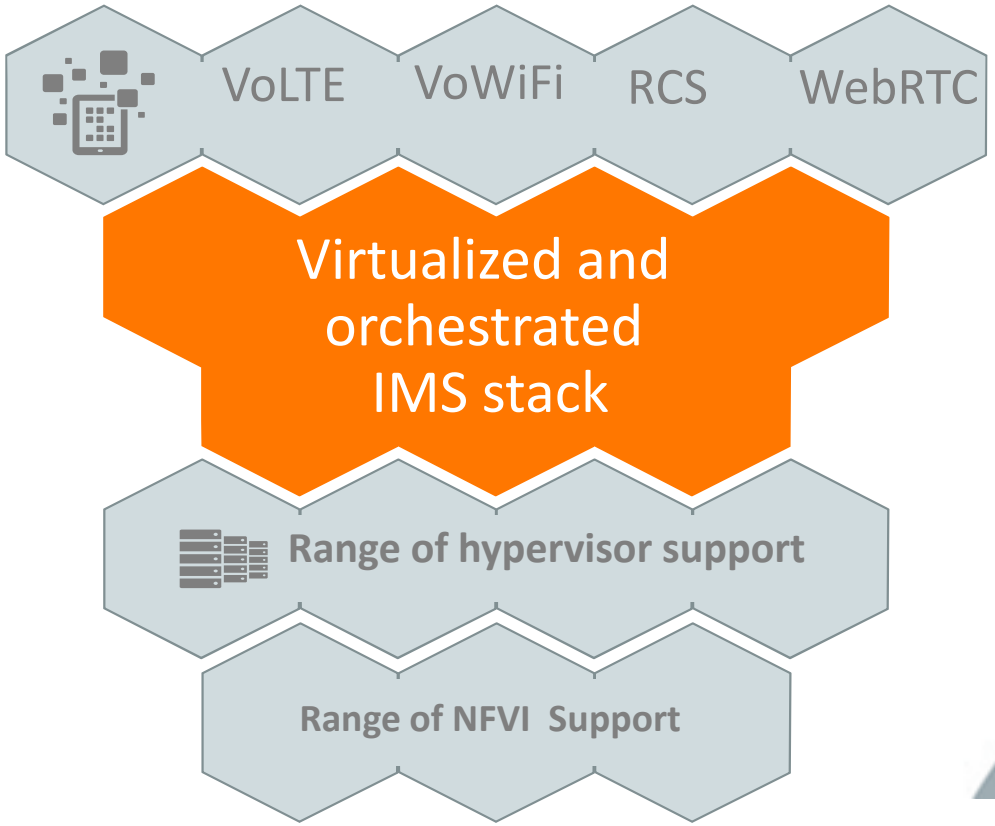
Rapid Evolution to IMS Services with NFV



Oracle Communications takes the complexity out of IMS

so you can focus on accelerating the modernization of your network and offer compelling services that are reliably deployed with internet speed and cost

Deployment Models

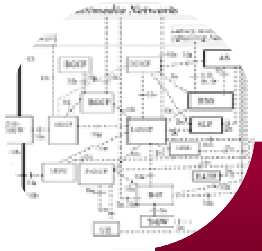
Rob to provide Jason's slide

Oracle IMS on NFV

Reduce time to market
Reduce OpEx & CapEx
Aligned with ETSI NFV framework

Oracle IMS

Consolidated IMS functional elements and interfaces
Standards based with out of the box functionality
Simple & cost effective to deploy, operate & maintain



Traditional IMS

Complex
Costly to implement and Operate
Long service innovation cycle and time to market

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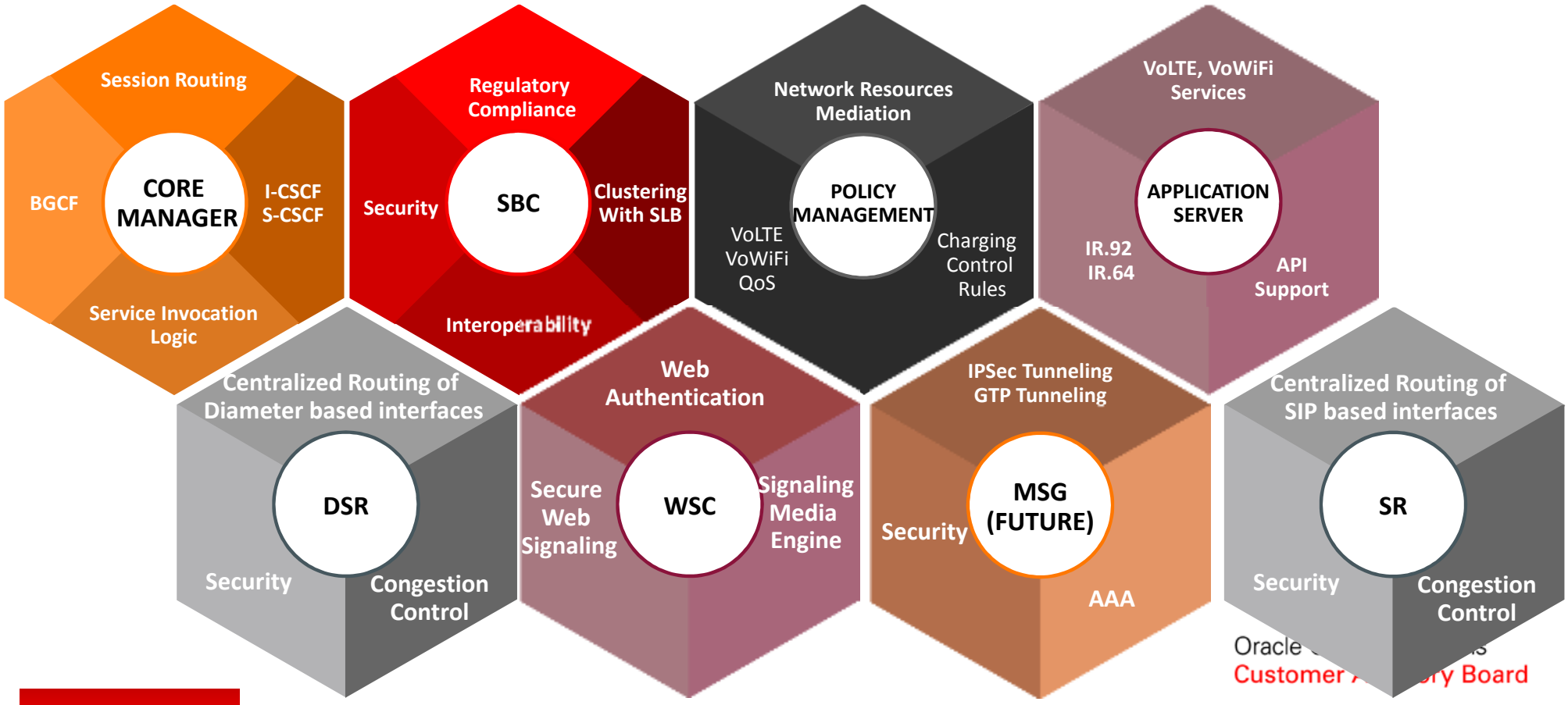
Virtualized IMS Network Functions



Differentiate VoLTE and VoWiFi Without Coding Using a Powerful and Highly Programmable, Drag and Drop Tool

Out of the Box Application

Session Design Centre

Configure and extend application logic

without coding!

Rapid Market Differentiation

With the lowest possible cost

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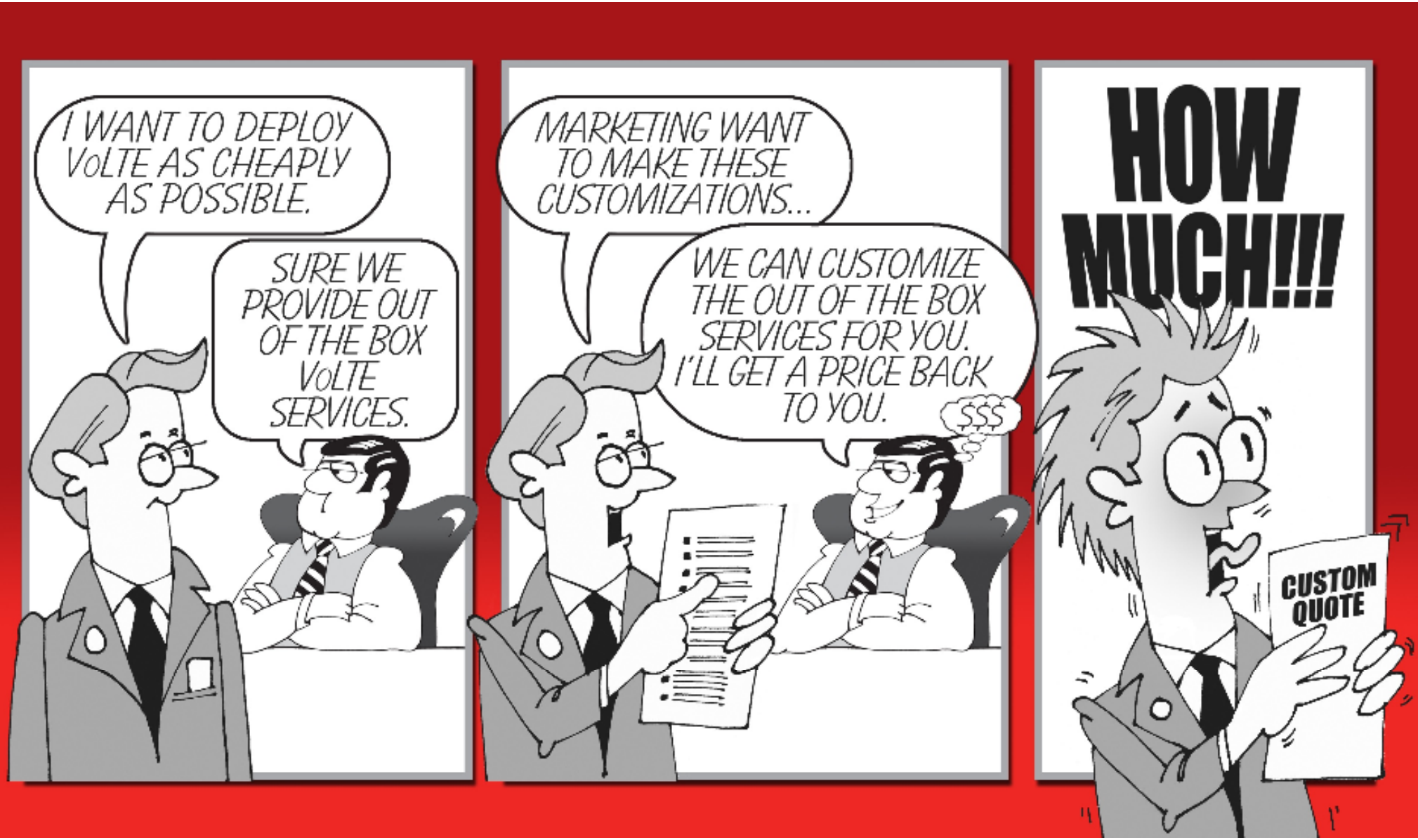
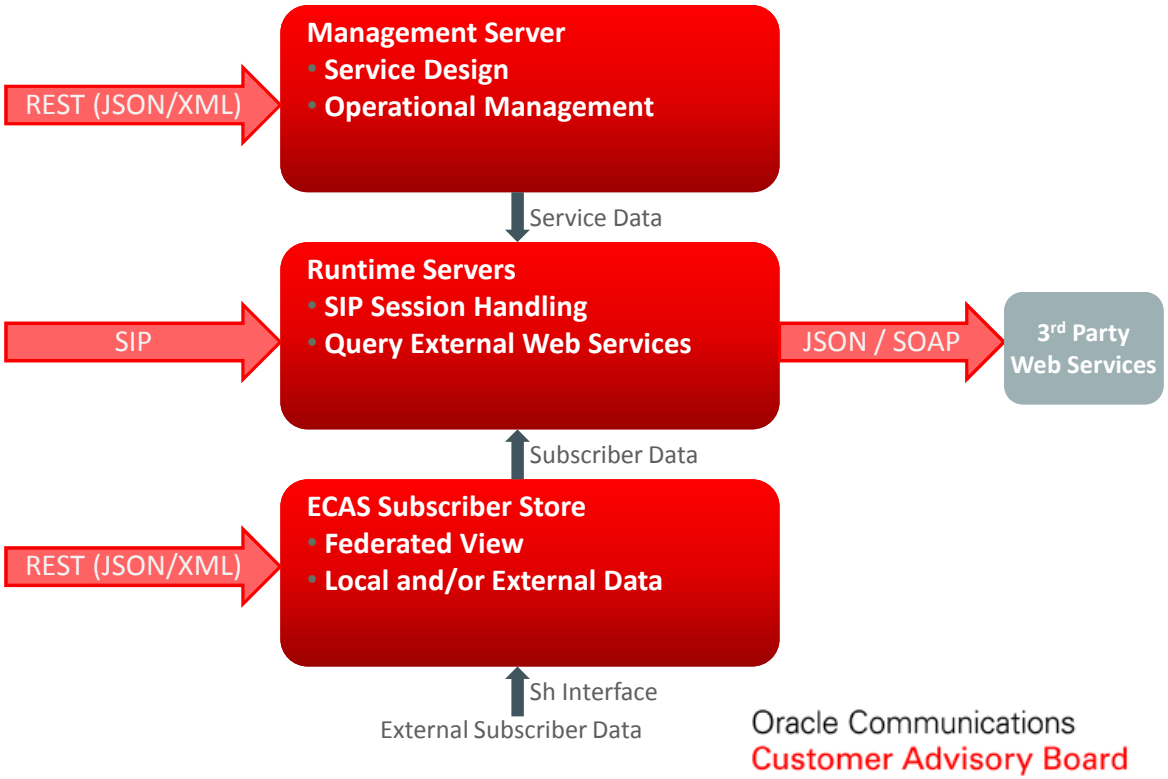

I WANT TO DEPLOY VoLTE AS CHEAPLY AS POSSIBLE.
SURE WE PROVIDE OUT OF THE BOX VoLTE SERVICES.
MARKETING WANT TO MAKE THESE CUSTOMIZATIONS...
WE CAN CUSTOMIZE THE OUT OF THE BOX SERVICES FOR YOU. I'LL GET A PRICE BACK TO YOU.
$$$
HOW MUCH!!!
CUSTOM QUOTE

New Forms of Interactivity, Ubiquity and Social Orientation

Converge IMS with web services

- A web service API can be defined through a UI and integrated into logic by dropping an activity
- Integrate with IT systems by using the management platform to expose the same APIs used by GUI (REST/JSON/XML)
- Permits advanced call time logic by triggering external platforms and requesting info



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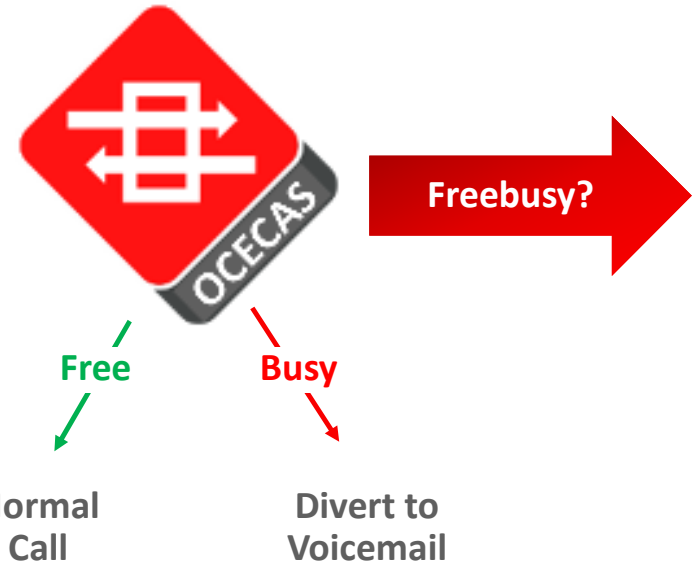
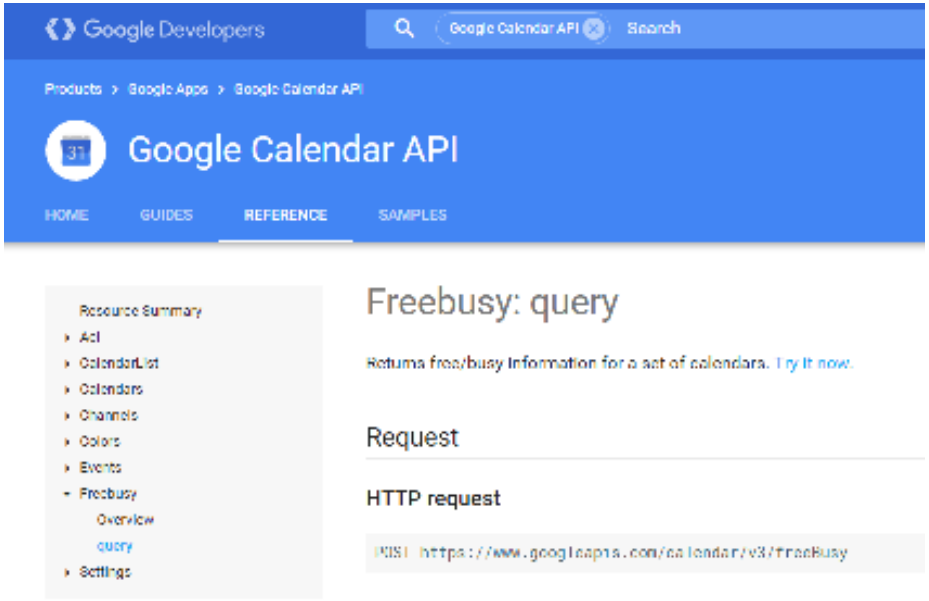
Converge IMS with Web Services: Google Calendar API





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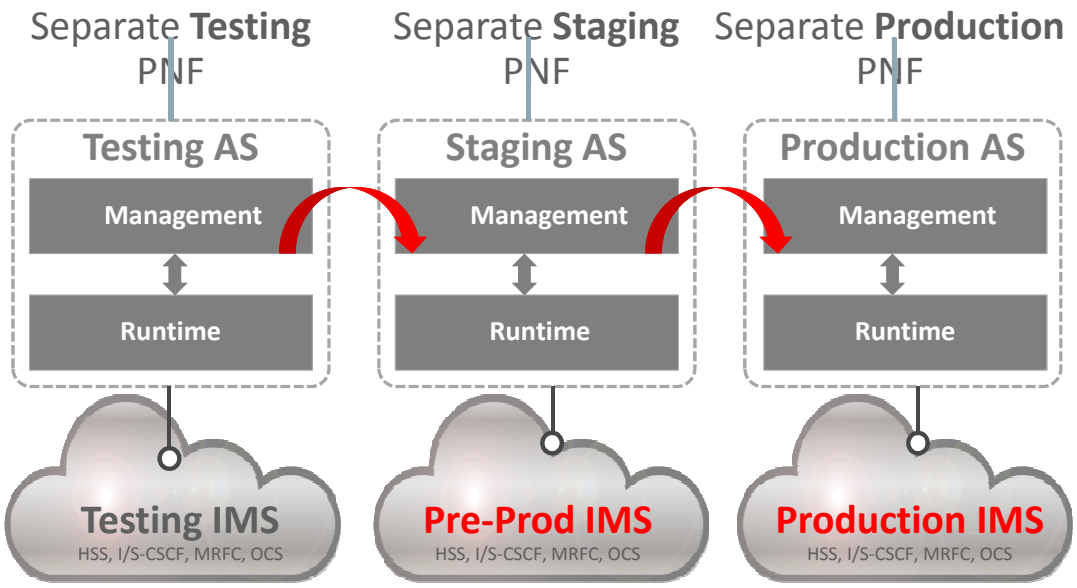
Traditional Comms App Server Deployment

New Service Rollout Or Modification

- Manual
- Error-prone
- Lengthy
- Risky
- **Costly**



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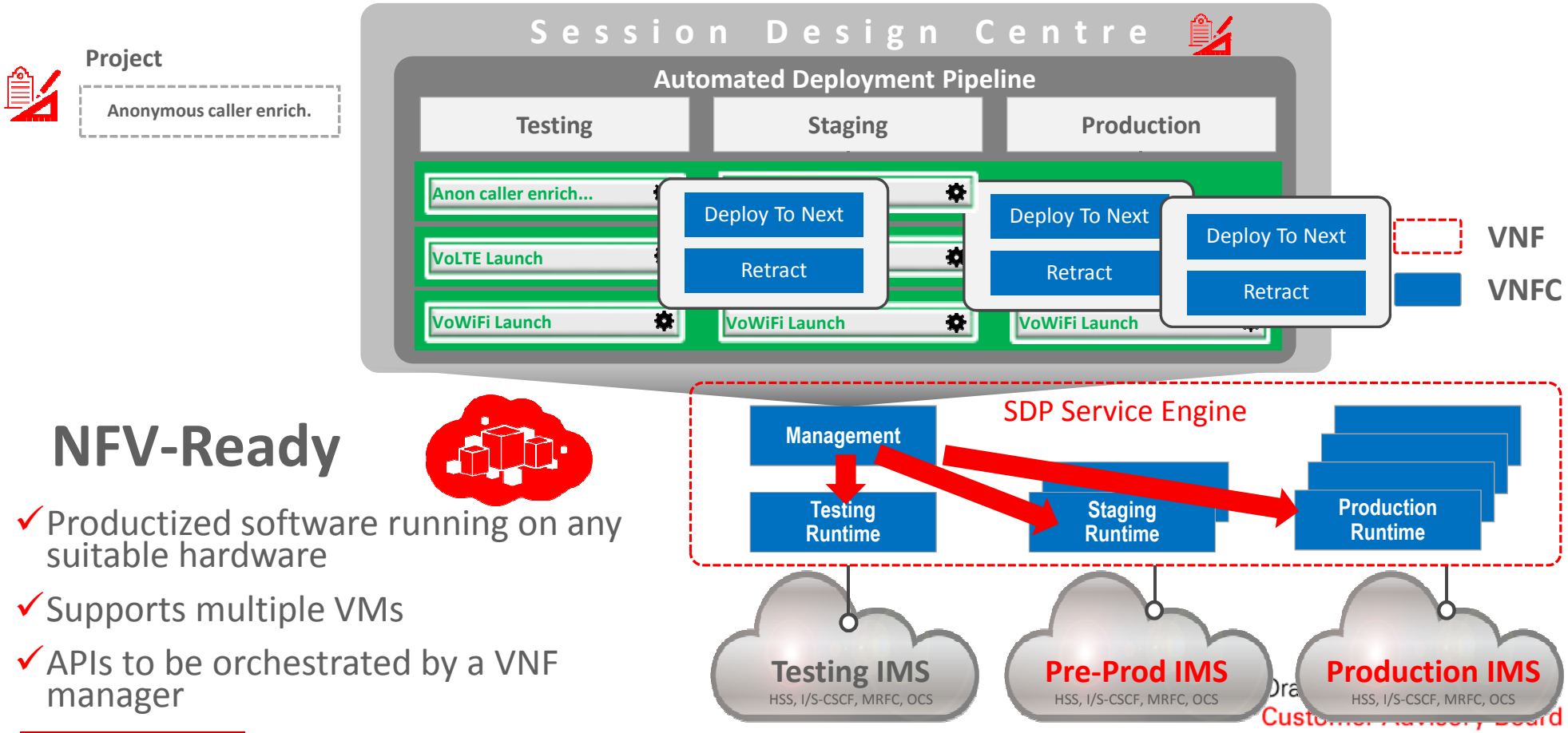
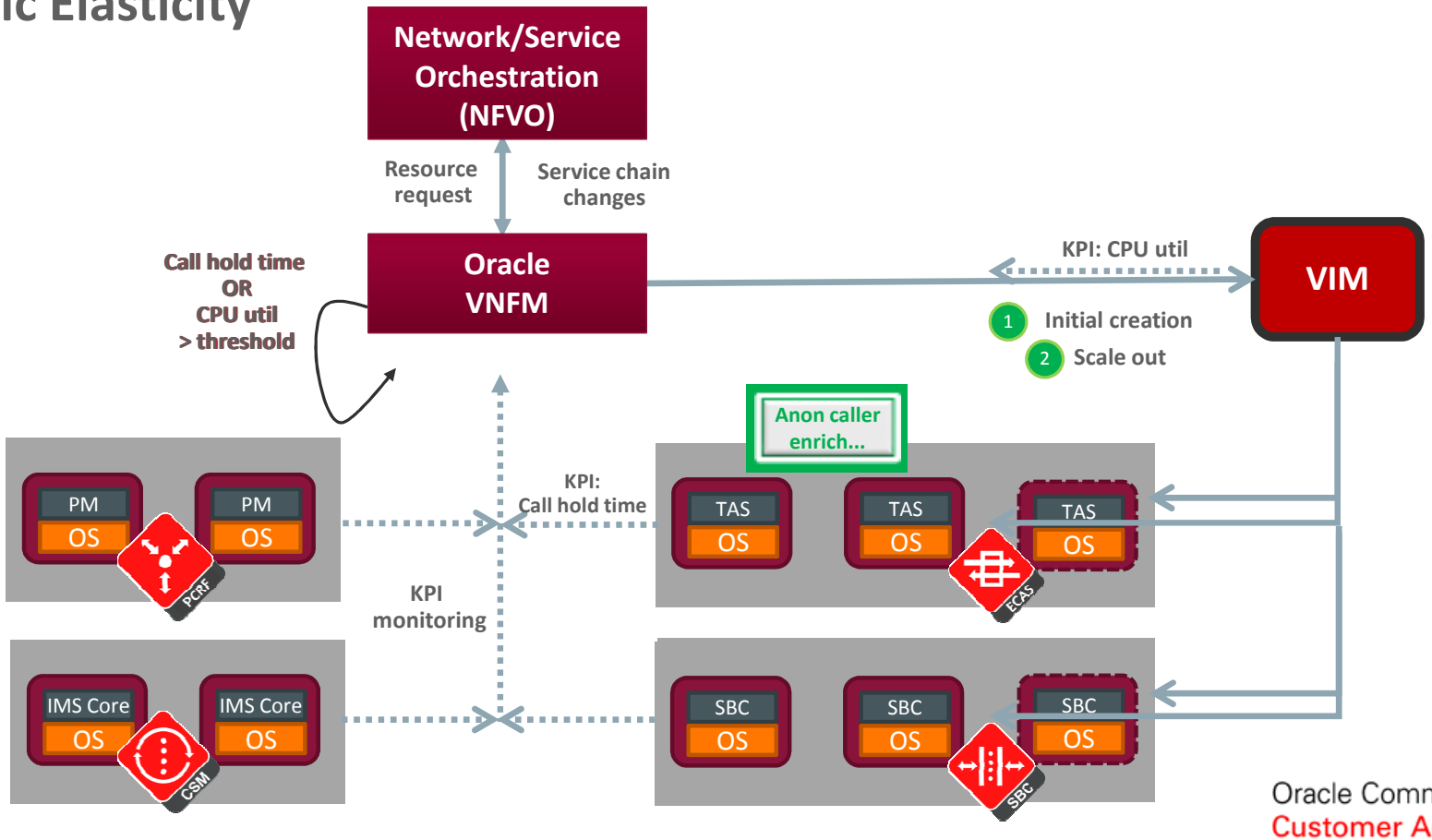


NFV-Ready

- ✓ Productized software running on any suitable hardware
- ✓ Supports multiple VMs
- ✓ APIs to be orchestrated by a VNF manager

Orchestration: Seamless service introduction

Dynamic Elasticity



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Fully Automated Orchestration

Automated control decisions
Elastically scale out the applicable VM instances

Aggregate KPI measurements
Aggregate performance measurements from each VNF instance to monitor its utilization
Capacity thresholds are crossed on the TAS and SBC

KPI thresholds

Effects of the new service Introduction

Call hold time increases

Total standing calls on SBC increases

Move away from rigid network architectures… to a flexible platform that can be programmed to dynamically address any number of current and future services

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Core Implications

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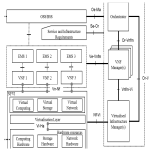
Oracle Communications Core Session Manager (OCCSM)

Virtualized Session Core for NFV

Fully supports 3GPP r12 S/I-CSCF, BGCF, & more

Designed from the ground up for ***virtualization***



Enables a fast path to starting NFV ***t o d a y***

Utilizes elastic scalability principles

- Dynamic Load Balancer support for virtualized environment
- Designed to scale from thousands to millions of subscribers
- Open NFV framework with multiple hypervisor support
- Optimized CAPEX pricing for IMS Core

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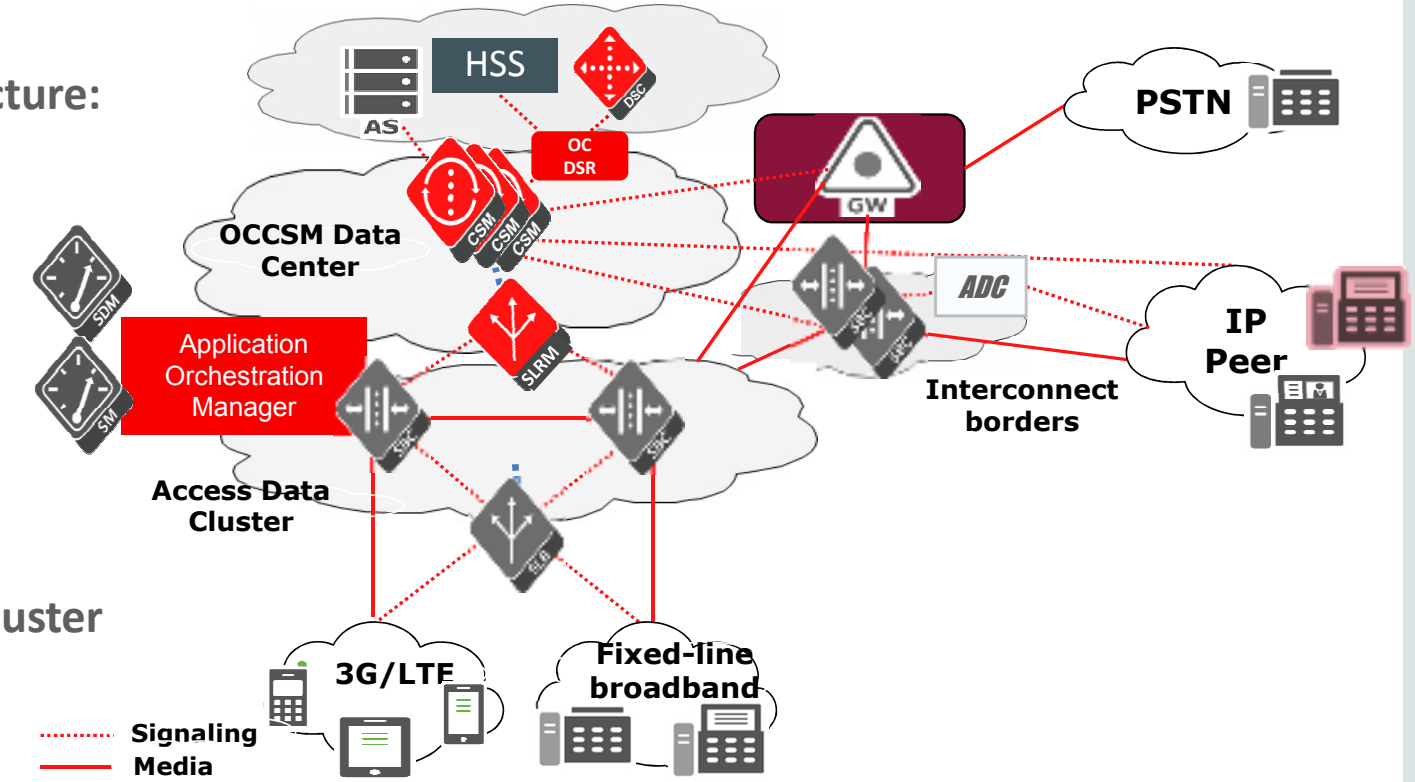
OCCSM/SLRM : Key enablers for an Agile vIMS

- Complete Virtualized Architecture: KVM/OVM
- Multi-tier data center deployment
- Designed to scale for millions of subs
- Load Balancing solution for Cluster
- IMS Core designed for NFV
- Intelligent Orchestration Ready



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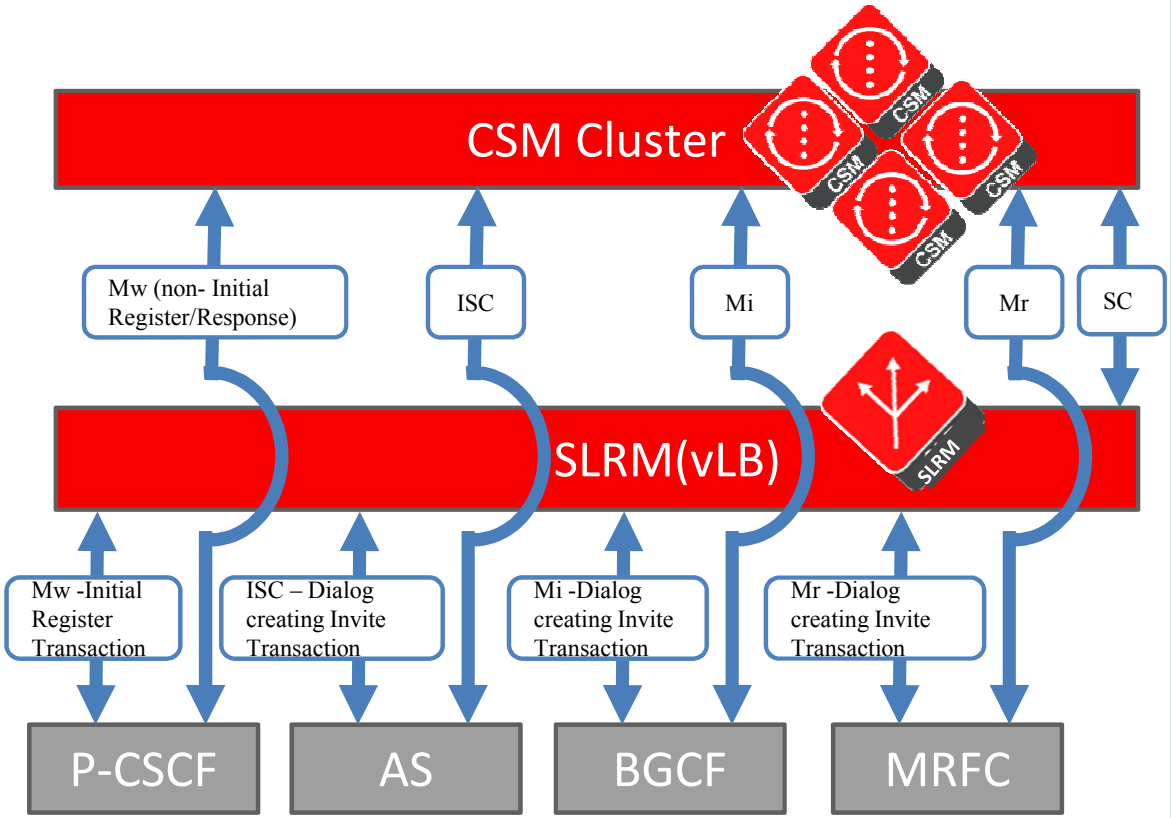
Role of Virtual LB (SLRM) building OCCSM cluster

OCCSM Load Balancing –

- SLRM act as Virtual Load Balancer managed and orchestrated by OCAO
- SLRM act as a single interface to CSM Cluster
- SLRM builds a prioritized list of CSMs
- SLRM groups CSMs for a user in multiple ways



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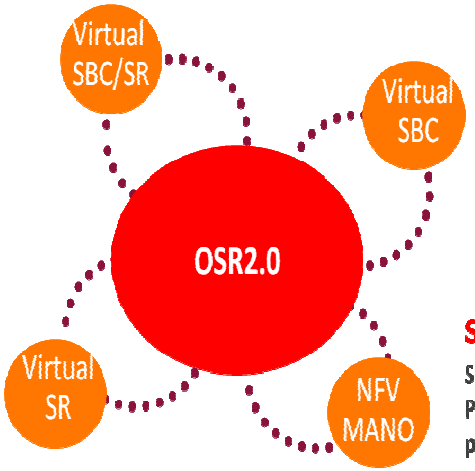
Oracle Communications NFV/SIP Interconnection Value Proposition

Agility

High level of agility is achieved by detaching the physical resources from the applications.
New applications & services are virtualized and instantiated on-demand in the cloud



Elasticity

High degree of workload adaptability to provision and de-provision resources in an automatic manner.
Able to dynamically adjust to the changing needs of users, applications and services over resources in a shared infrastructure

Simplicity

Simplifies operations of a cloud networking environment.
Presents an integrated network and service management view binding both physical and virtual resources to a particular service for advanced optimization, monitoring and troubleshooting

Scalability

Ease of scalability as SW & HW are virtualized.
Virtualized SW can be instantiated on what the needs are and where physically the capacity is needed.
Virtualized HW can easily scale by adding more capacity in areas where it is needed

Use Case 1 : Signaling in the Elastic Cloud

- Virtual SBC/SR for hybrid networks with HW based pooled transcoder
- CAC in a centralized mode
- Multiple virtual SBC/SR configurations per instance based on network interconnect topology

Use Case 2 :Simplified SIP Session Routing

- Virtual SR for both internal and external networks
- Multiple virtual SR configurations per instance based on call flow
- Distributed virtual SBC
- IMS core server overload protection
- RCSe interworking for interconnect

Use Case 3 : Process automation for VNF lifecycle management

- Auto instantiation, configuration & scaling
- VNF portability (hypervisors)
- New KPIs for analytics & reporting

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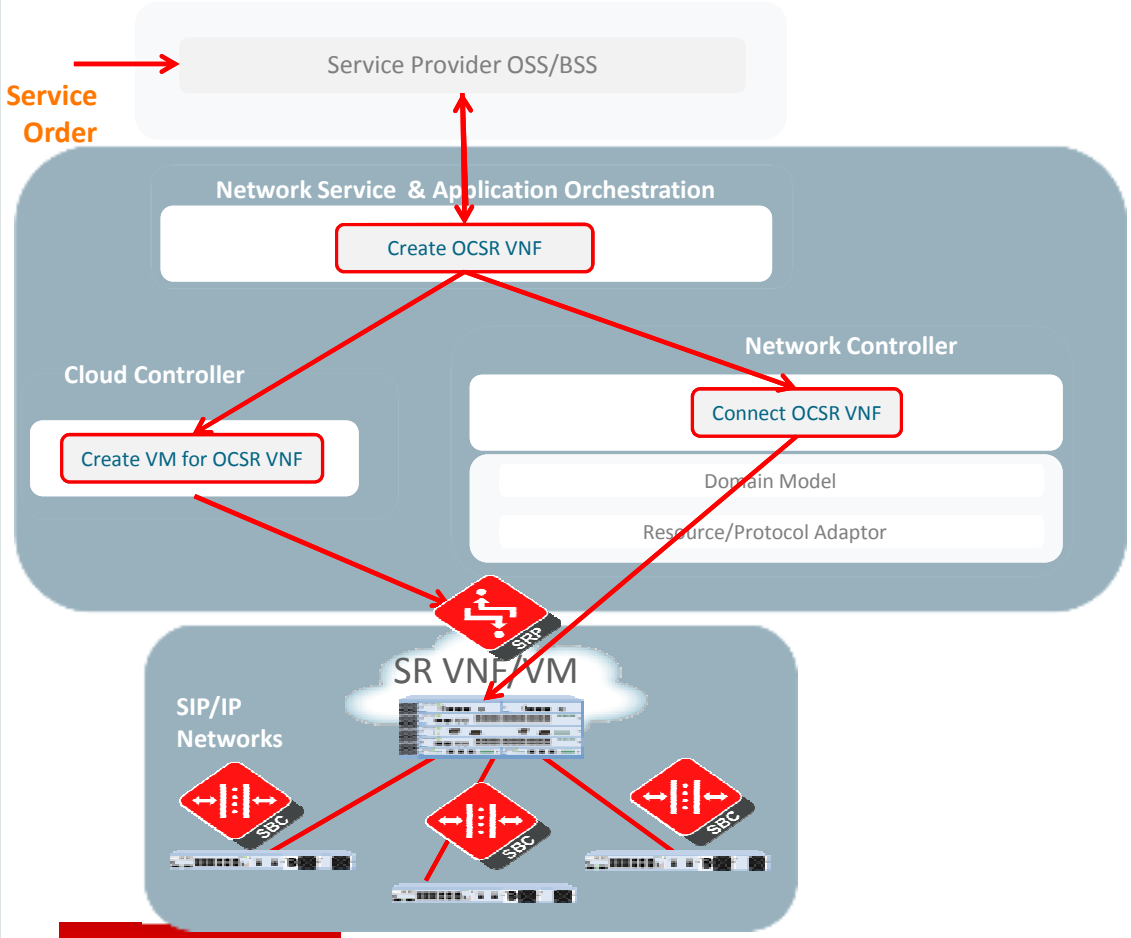
OCSR : Automate VNF creation, activation & network connection



Automate creation of OCSR VNF instances and stitching into the SIP routing network

OSS/BSS requests creation of OCSR VNF

Customer Service Order which requires a OCSR Virtual Network Function

Oracle Network Service & Application Orchestration creates VM

Oracle Network Service Orchestration stitches OCSR VNF into SIP/IP network

Oracle Network Service Orchestration returns success to OSS/BSS

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VoLTE Features: Security

Why is this important?

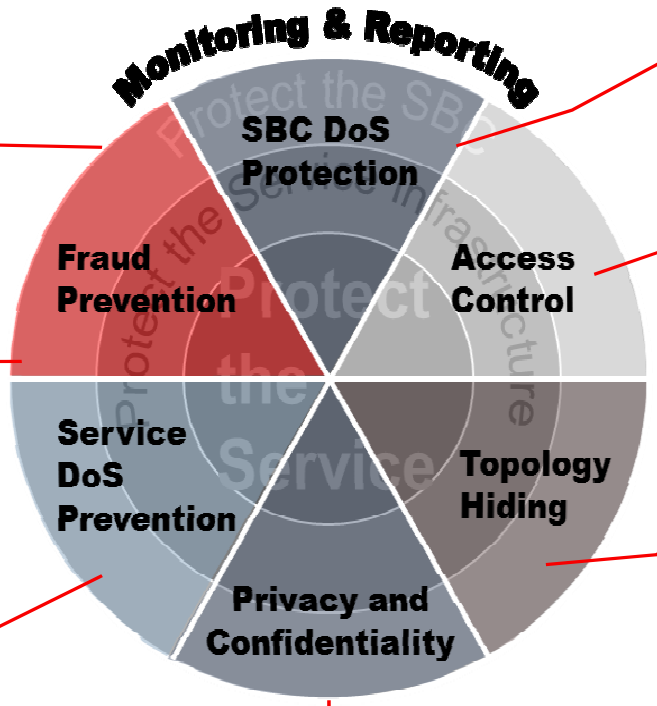
VoLTE is IP based and more susceptible to denial of service (DoS), eavesdropping and other malicious attacks as opposed to CS networks

What Oracle delivers:

- Comprehensive NetSAFE© architecture
- Topology hiding
- Dynamic rate limiting
- SIP Digest and IMS authentication and key agreement mechanisms
- Support for IPSec, TLS, SRTP
- DoS and DDoS protection
- GSMA IR.88 compliant

Net-SAFE™ Security Framework

Protect the SBC, Protect the Infrastructure, Protect the Service



Monitor, report and record

Protection against malicious and non-malicious DoS attacks and overloads

Prevent misuse and fraud, and protect against service theft

Dynamic, session-aware ACLs for signaling and media with wire rate packet filtering.

Protect against reconnaissance scans and targeted attacks

Prevent DoS from reaching service infrastructure

Encryption with L2 and L3 VPN separation

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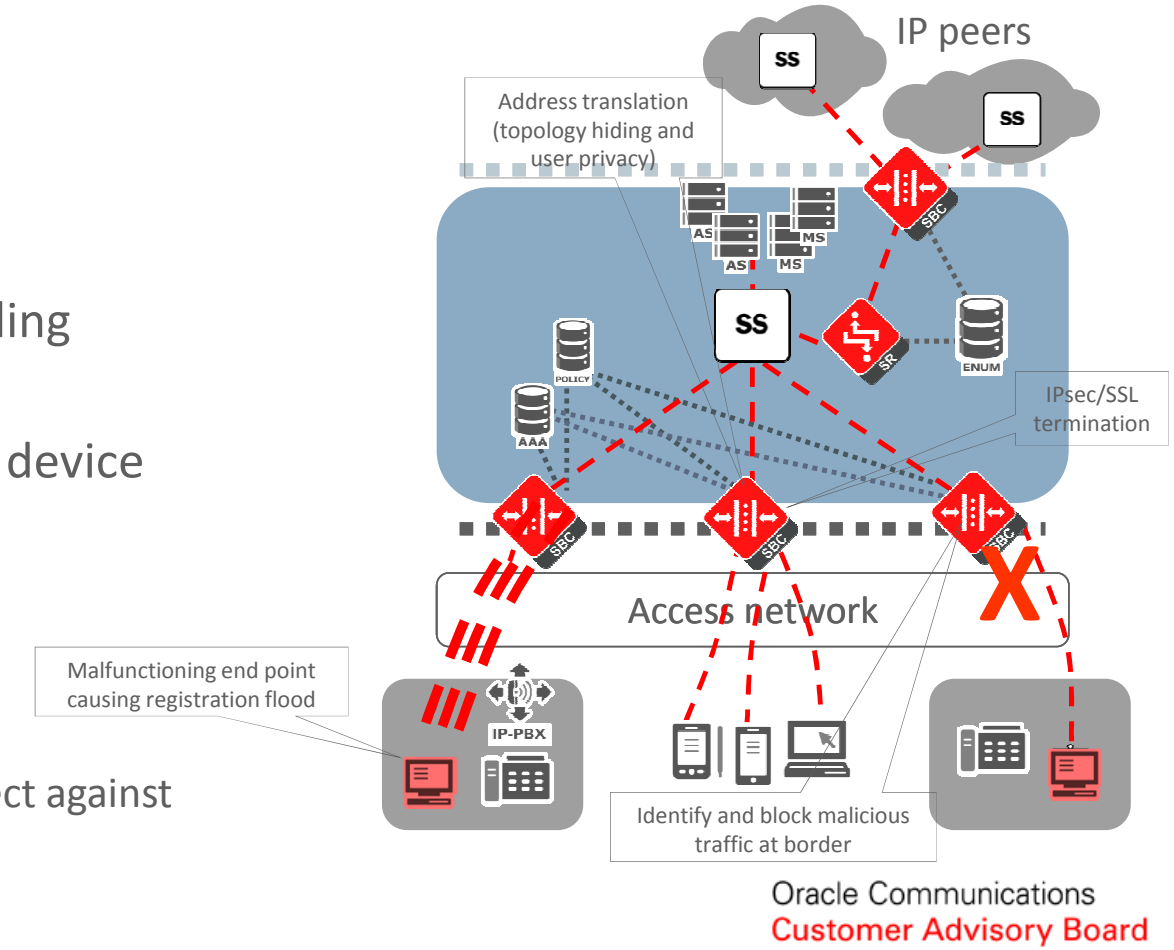
OCSBC: Border Security

- Allow only validated traffic
- Topology Hiding
- Protect core against DoS and signaling overload attacks
- Limit registration traffic to prevent device overload
- Protects upstream service infrastructure
  - Call rate limiting and call gapping
  - Media and signaling validation to protect against service fraud



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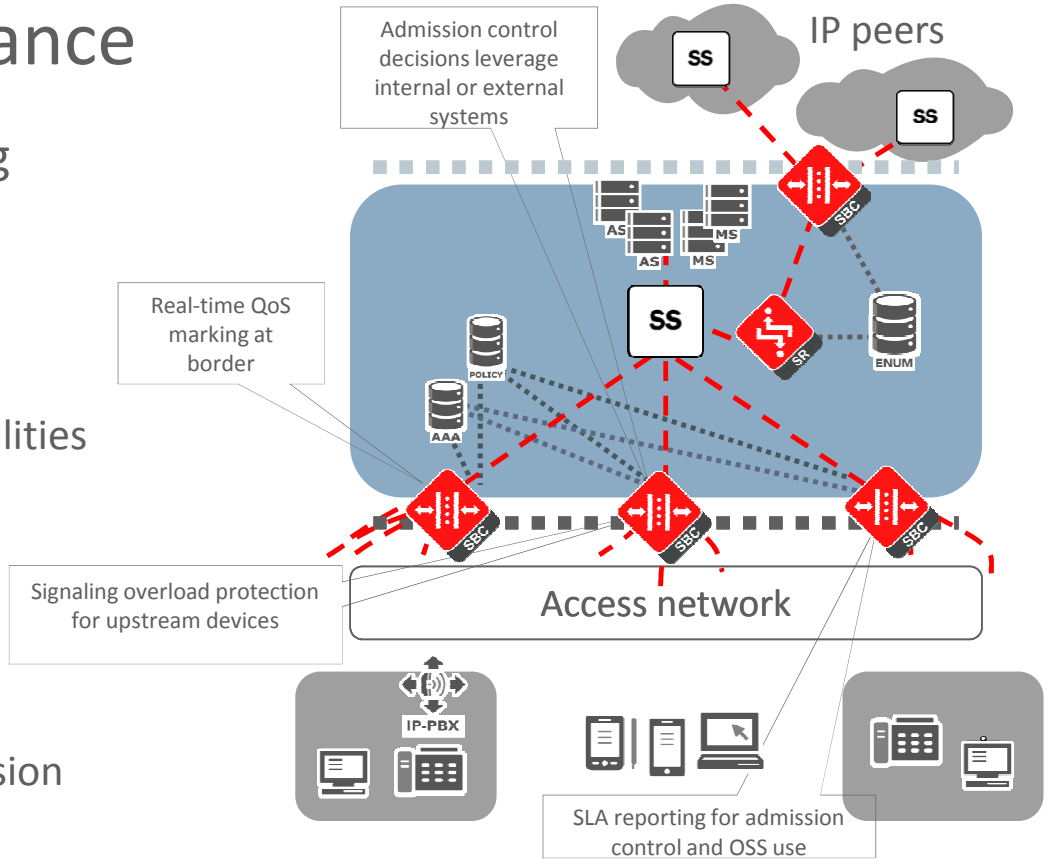
OCSBC: QoS and SLA Assurance

- Assure core resources before admitting session
  - Ensure border/core resource and bandwidth availability
  - Leverage internal and external policy capabilities
- Enforce service levels
  - Define QoS marking and mapping at border
  - Prioritize traffic as it enters
  - Report actual session quality for SLA/admission control use



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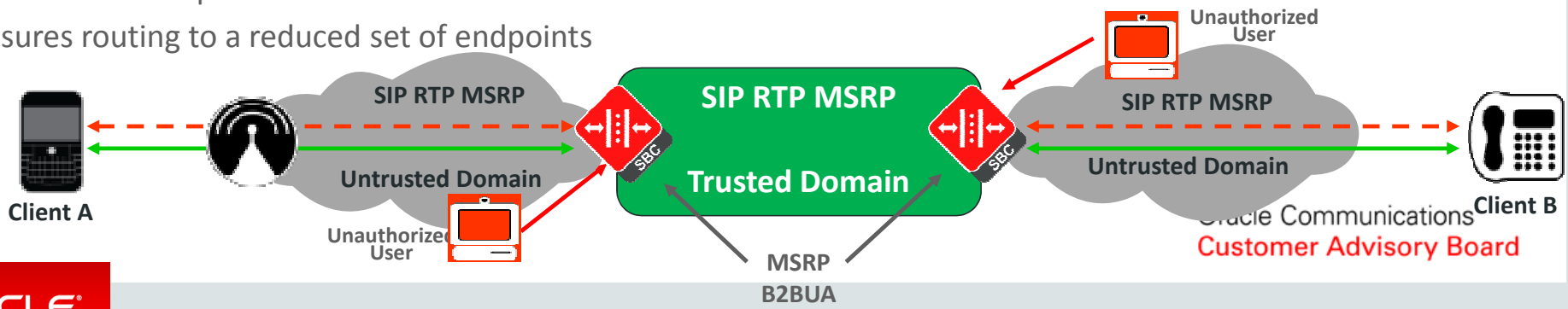
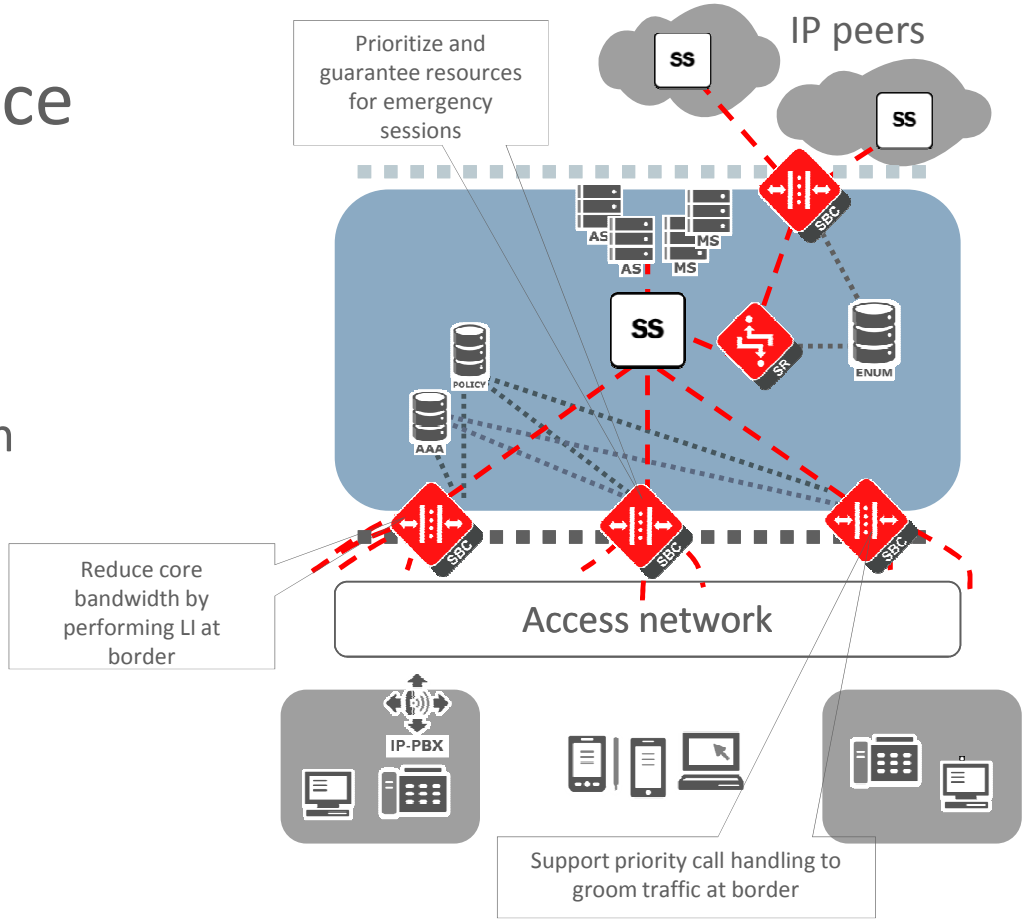
OCSBC: Media Firewall

- Media firewall allows only authorized media to consume network resources
  - Addresses learned from trusted session setup (SDP/media flow)
  - Authorized traffic passes through tightly controlled pinholes
  - Topology hiding for media
- Ensures only authorized device pairs communicate
  - Prevents device cross communication
  - Eliminates stray media flows (malicious and defective)
  - Media flow encryption (SRTP, MSRP/TLS)
- Reduces media addresses to known values
  - Avoids need to open access control blocks
  - Ensures routing to a reduced set of endpoints



OCSBC: Regulatory Compliance

- Assure emergency Calling Support (E-CSCF)
  - Priority call handling
  - Network-Provided Location Information (NPLI)
- Capture lawful intercept traffic at border
  - Reduce core traffic by capturing intercept call at border
  - Mid-call target activation/removal



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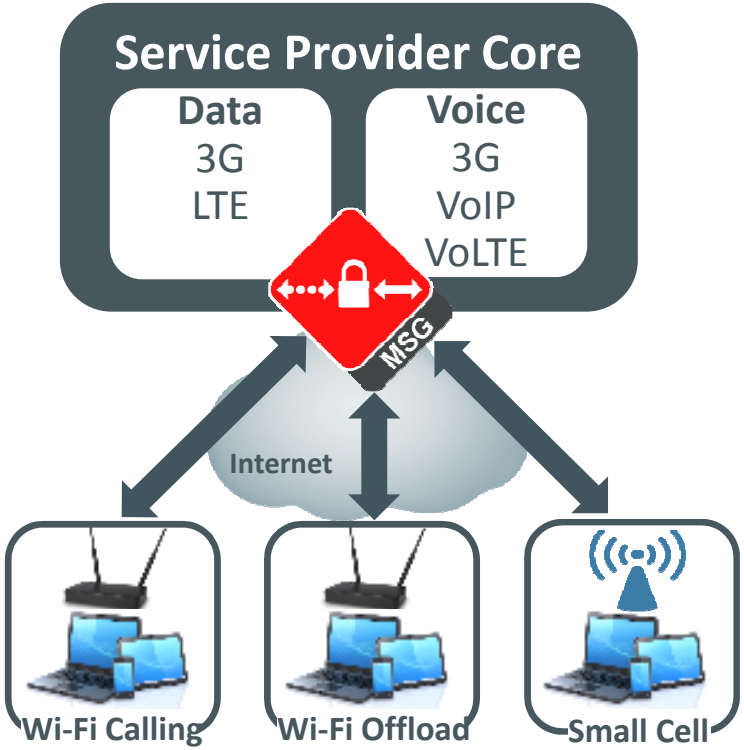
Oracle Communications Mobile Security Gateway (MSG)



Delivery of voice, video and data services across Wi-Fi and Pico/femto cell

- Support of 3GPP functions: Security Gateway, TWAG and ePDG.
- Very low latency (wirespeed) required for real-time services

Security device for the network edge

- DDoS prevention, overload prevention, fraud prevention, service theft prevention, L3/L4 attack prevention.
- Comprehensive Authentication suite: EAP, Certificates, Digest

Performance

- IKE and IPsec tunnel set-up rate and concurrent tunnels
- Unaffected performance when experiencing an attack

Resilient, scalable and flexible deployment

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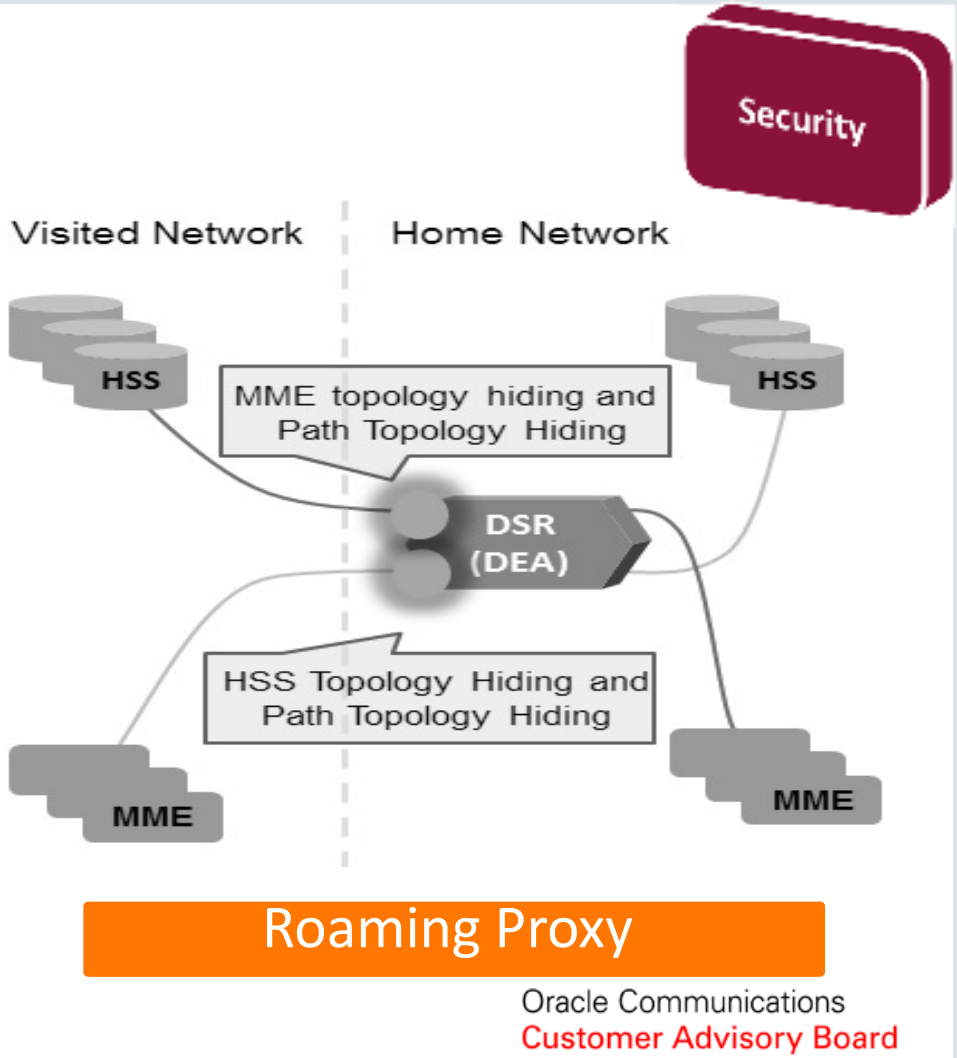
OCDSR Security Benefit

- GSMA IR.88 compliant (guidelines for LTE /IMS roaming)
- Secures the signaling network with:
  - A single demarcation point
  - Topology hiding
  - Encryption: IPSec, TLS/DTLS
  - Access control list for static IP addresses and connection management at the edge
  - Message screening (white-list and black-list)
- Protection against DoS attacks with the most robust congestion control at the edge



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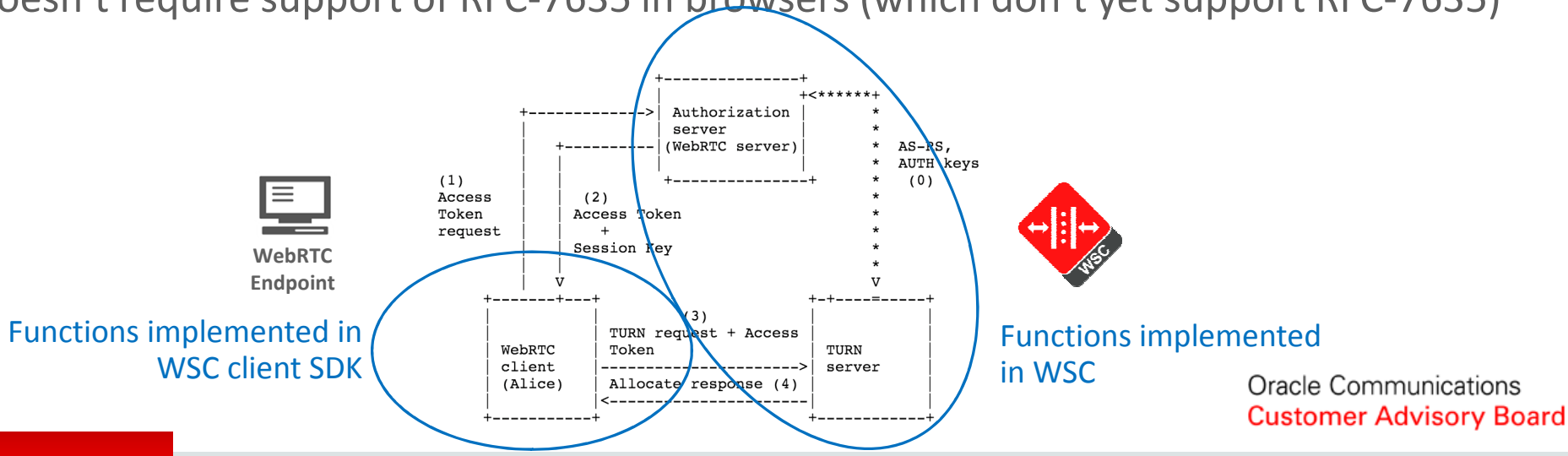
TURN Long Term Credential (LTC) Auth (new in WSC 7.2)

- To protect against unauthorized use of network TURN resources, a long-term credential (LTC) authentication mechanism is specified in RFC-5389
- WSC 7.2 implements support for TURN LTC third-party authentication using a mechanism & described in the next slide (based on RFC-7635 reference model below)
- Doesn't require support of RFC-7635 in browsers (which don't yet support RFC-7635)



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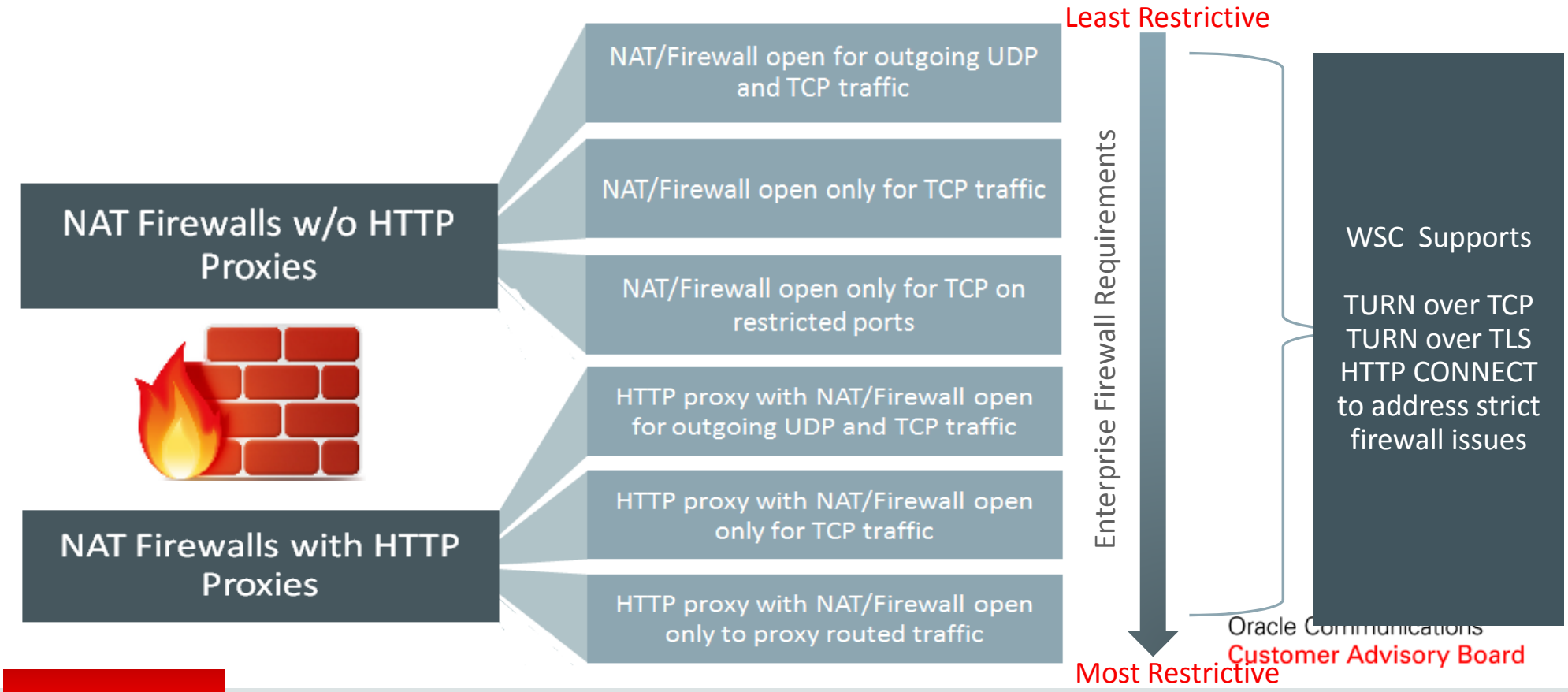
Strict Firewall Traversal and HTTP Proxies



Oracle Communications Policy Management

>60 Live Deployments

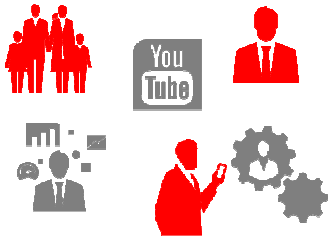
43 Tier 1 operators.

39 countries.

Largest live LTE network.

First VoLTE Network

100M+ Session Deployments



Deep Use Case Portfolio

Shared Data

Casual use / Promo

Speed Boost

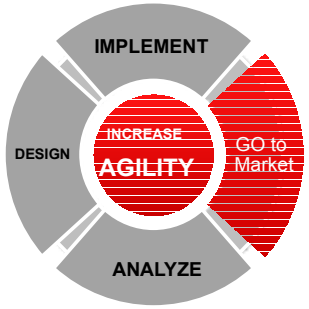
Personalized Services

Voice over LTE/Voice over WiFi

Policy Manager: Core Business Component

PCRF is key to Oracle Communications.

Not an ad-hoc add-on to other network functions.



Focus on NFV

Providing operators with tools to increase service agility and monetize the network.

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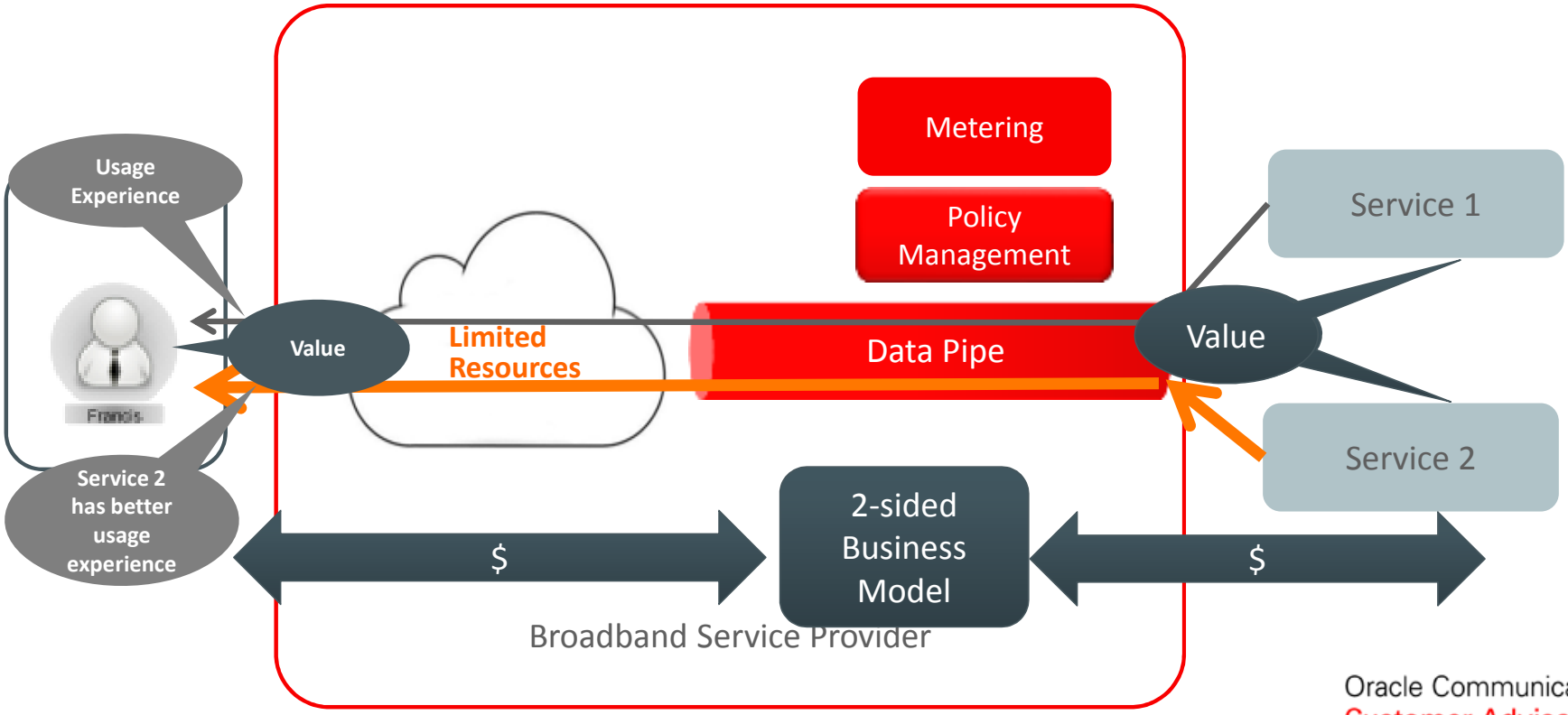
Policy Management: The Brain of the Network



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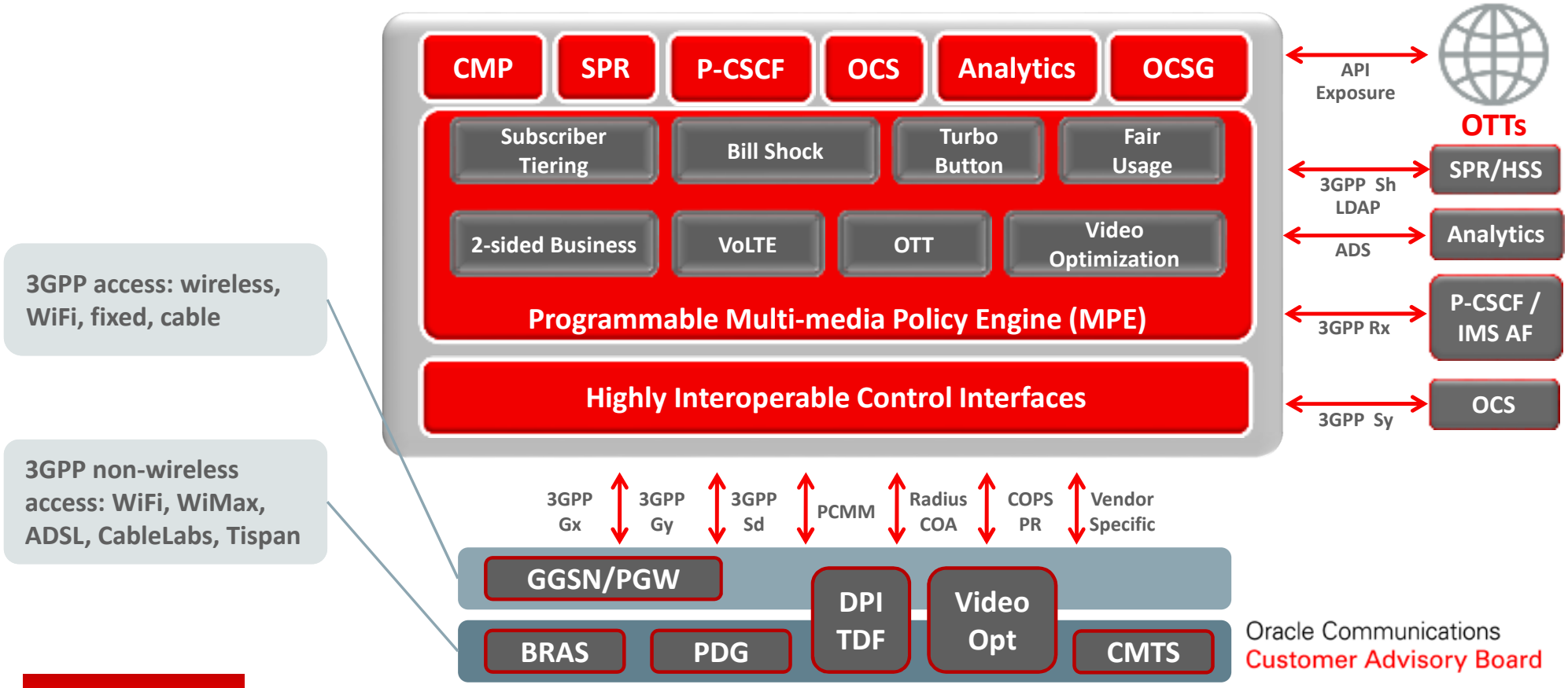
Oracle Communications Policy Management



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Components of Effective Policy Creation

Triggers

Application

- IMS Proxy CSCF
- Direct Signaling via Branded or 3rd Party/OTT Application

Subscriber

- Portal
- VOD Server Request

Transport

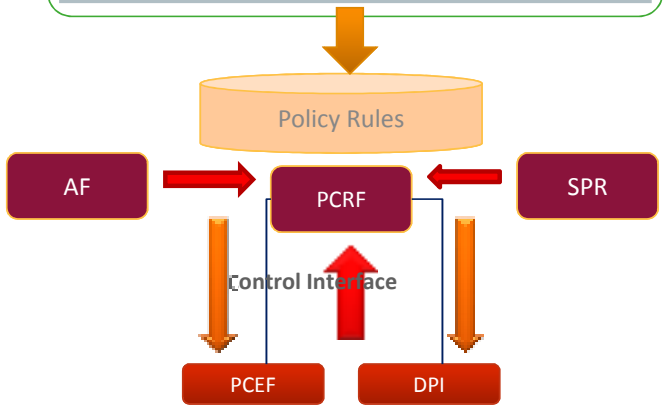
- Subscriber Session Connection (GGSN/P-GW/S-GW)
- Deep Packet Inspection

OSS/BSS

- Service Delivery Platform

Conditions

- Subscriber Tier/Entitlement
- Roaming Status
- Network Capability
- Application Type/Priority
- Application Usage
- Time of Day/Day of Week
- Device Type
- Volume and/or Duration Limits
- Aggregate Bandwidth Thresholds



Actions

- Push Filters, QoS and Charging Rule to Enforcement Point
- Push Messages to Other Entities
- Set Volume and/or Time Thresholds
- Virtual Call Admission Control
- Push DSCP Overwrite for the Session
- Generate SMS to End User
- Redirect Session
- Alarm Generation

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Policy Creation - Wizard

Wizard Driven Policy Creation Process

- Intuitive process accelerates service

Triggers

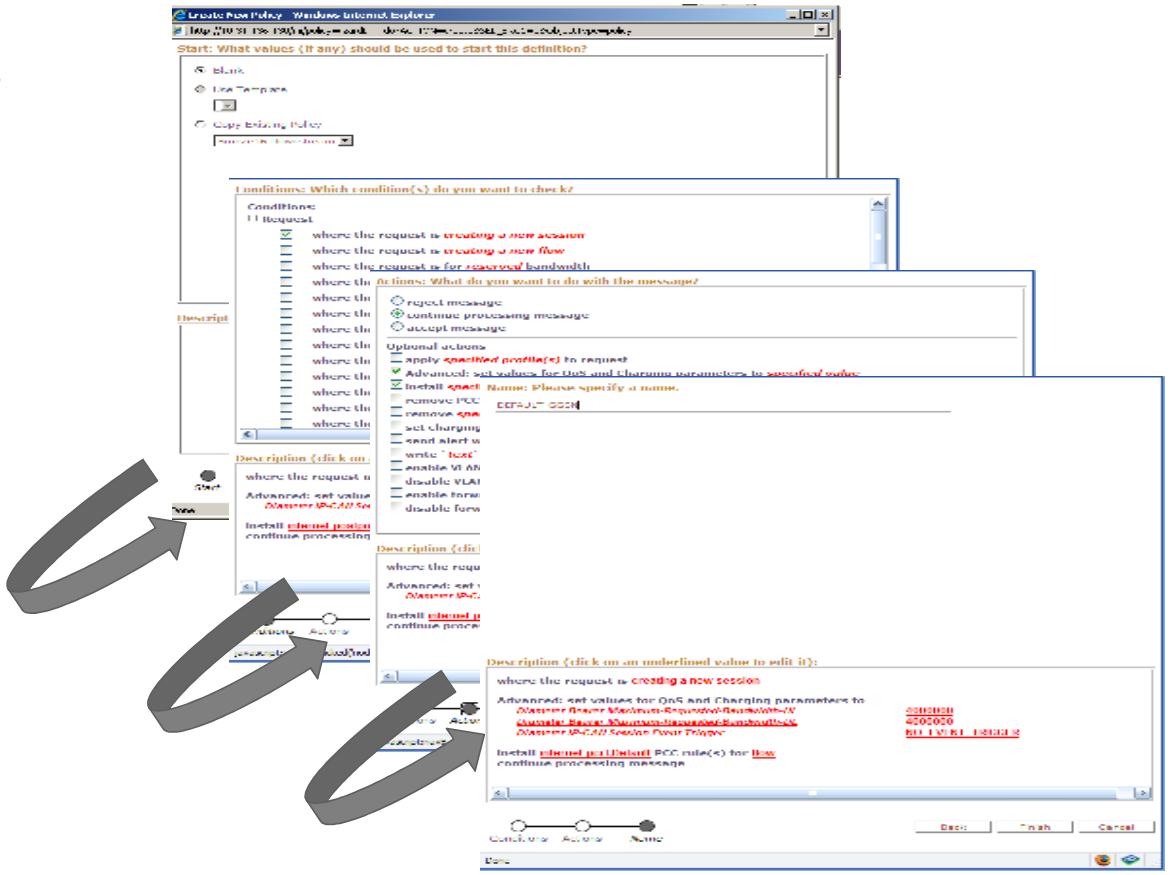
- Events that initiate the evaluation of policy conditions

Conditions

- The conditions within the trigger under which the policy will be activated

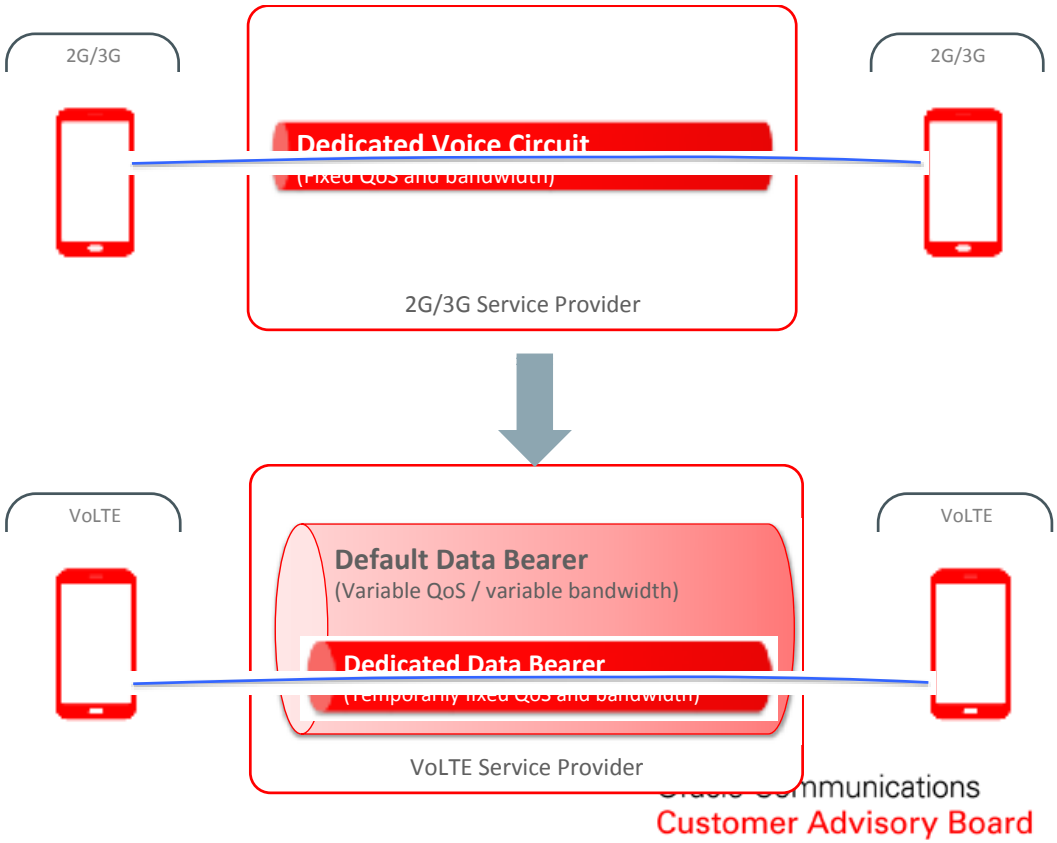
Actions

- The actions that need to be taken to result in the required outcome



The Challenges of Policy for Voice Services

- Fixed-line and 2G/3G mobile networks reserve dedicated voice circuits with pre-established QoS and bandwidth ideal for voice delivery
- Such dedicated voice circuits are not available in LTE and WiFi networks
  - All-IP data networks originally engineered for delivering non-real-time services
  - Voice becomes just another data stream sharing resources with all other traffic
  - Network must have appropriate mechanisms to distinguish and prioritize voice traffic



Policy for Voice Services vs. Data Services

- Most data services, including streaming video, can be delivered as non-real-time services
  - Most data services can be delivered asynchronously, some only require best-effort QoS (there are some exceptions)
  - Streaming video can be buffered to give the impression of real-time delivery
- Voice services, on the other hand, can only be delivered in real-time
  - Two-way conversational nature of voice communications requires unbuffered, real-time delivery, and dedicated QoS

Subscriber Expectations for Voice Service

- Subscriber expectations originally established with fixed-line Internet services delivered to computers
  - These expectations carried over when data services went mobile
  - Subscribers will tolerate a lower QoE for data services (even for some OTT VoIP services)
- Subscriber expectations for voice rooted in over a century of highly reliable delivery
  - The same QoE that would be tolerable for data services is not acceptable for voice
  - No “default” network state that can deliver quality voice services

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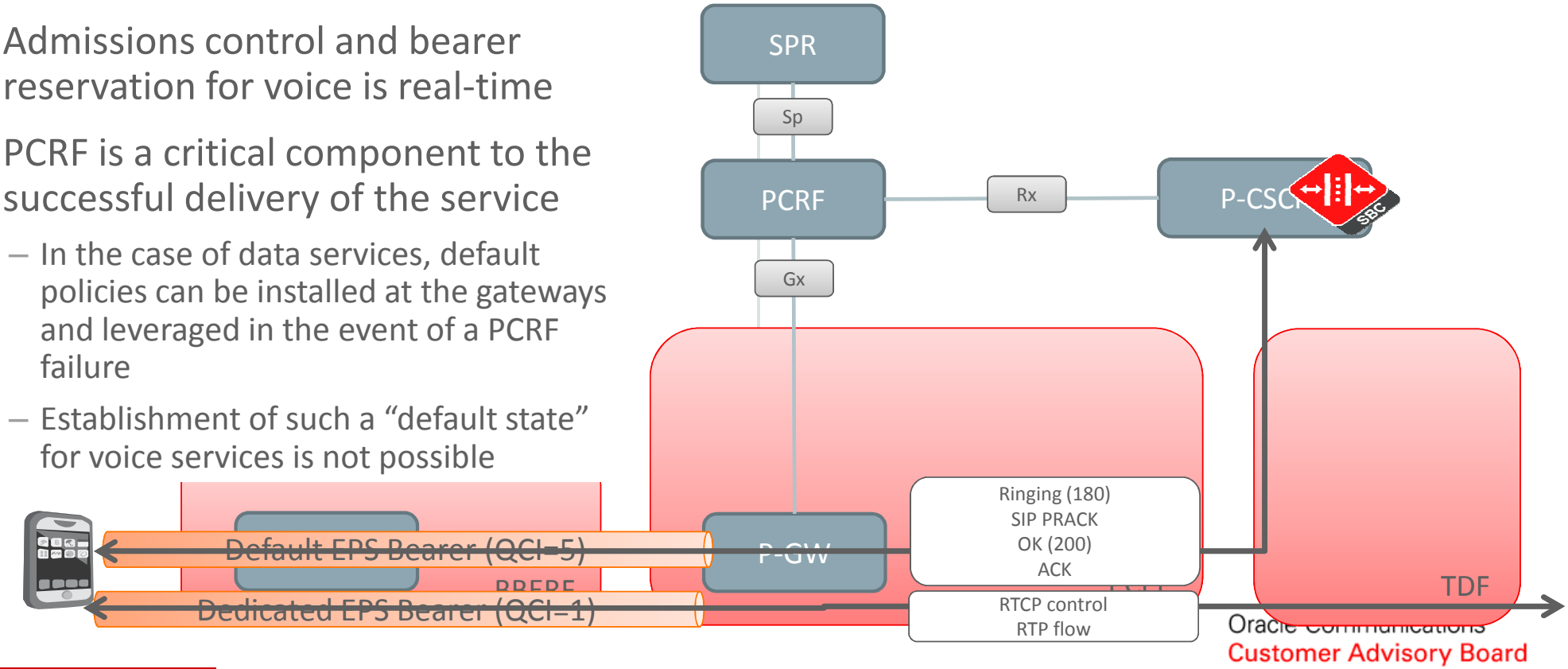
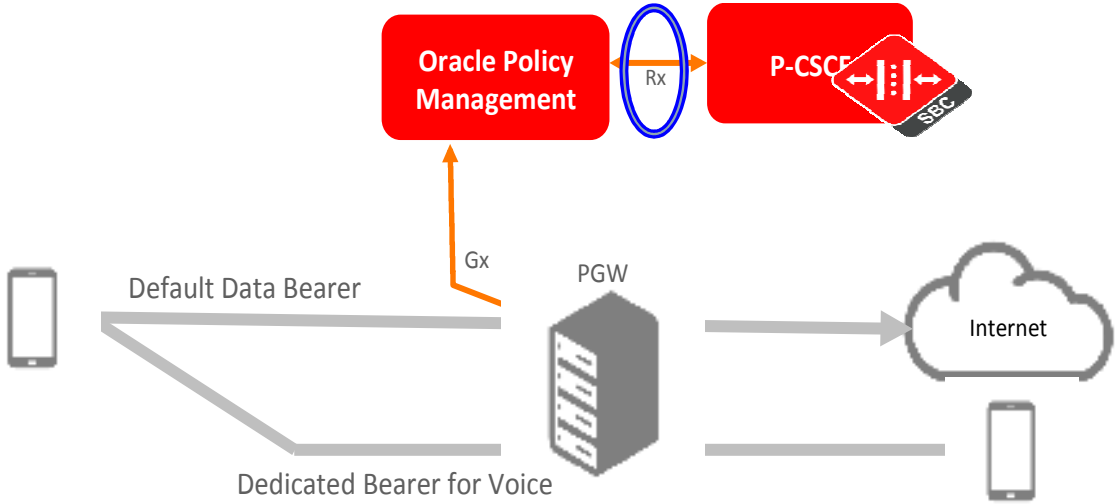
Role of Policy Management for Voice Services

- Admissions control and bearer reservation for voice is real-time
- PCRF is a critical component to the successful delivery of the service
  - In the case of data services, default policies can be installed at the gateways and leveraged in the event of a PCRF failure
  - Establishment of such a “default state” for voice services is not possible



Policy Management for Voice Services

- Reservation of data paths with dedicated QoS and specific priorities
  - Rich, flexible library to support various codec, vendor-specific AVPs, and other parameters
  - Extensive ecosystem of interoperability in multi-vendor environments
- Stateful awareness in the core network
  - Ability to correlate Rx sessions to the correct IP-CAN session
  - Subscriber binding to insure all related sessions from a subscriber are correlated
- Ability to facilitate eSRVCC and extend coverage with VoWiFi handover triggered from IMS network



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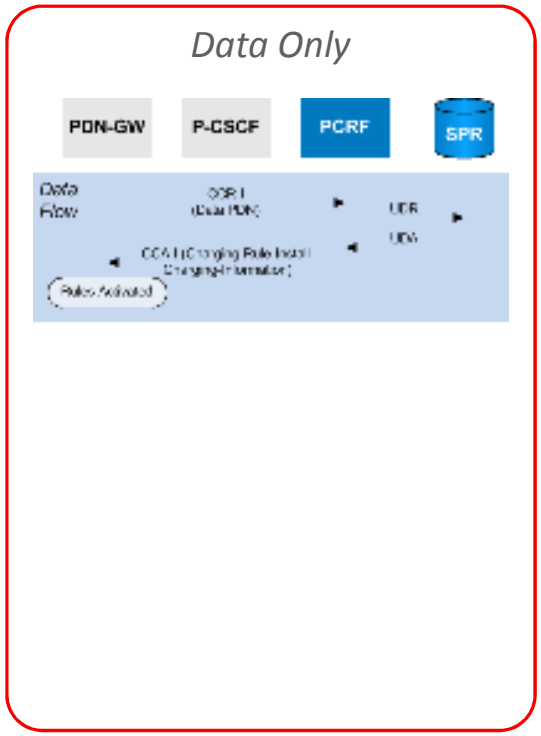
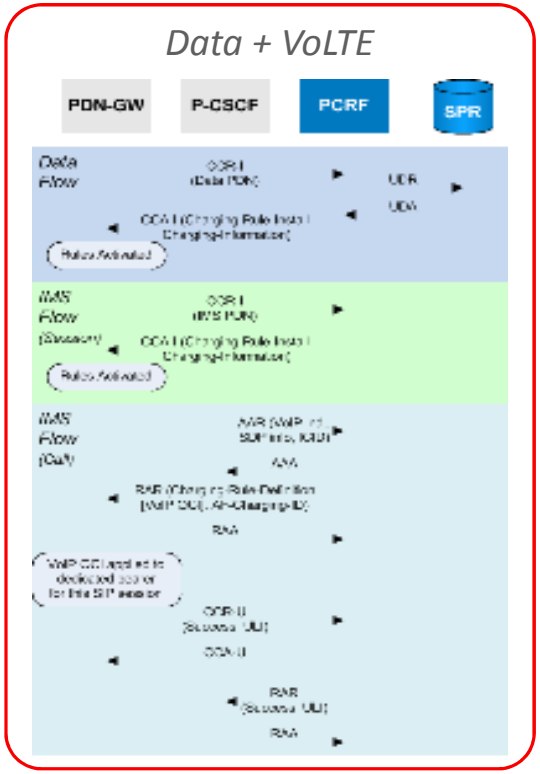
Performance Requirements for Voice Services



- VoLTE significantly increases Diameter transaction rates versus standard data services
- Example
  - Avg. data session duration: 4 hours
  - Avg. call rate: 12 calls/day
  - Data only: **24 msgs/sub/day**
  - Data + VoLTE: **122 msgs/sub/day**
- Oracle Communications Policy Management support 180M+ subscribers at these rates



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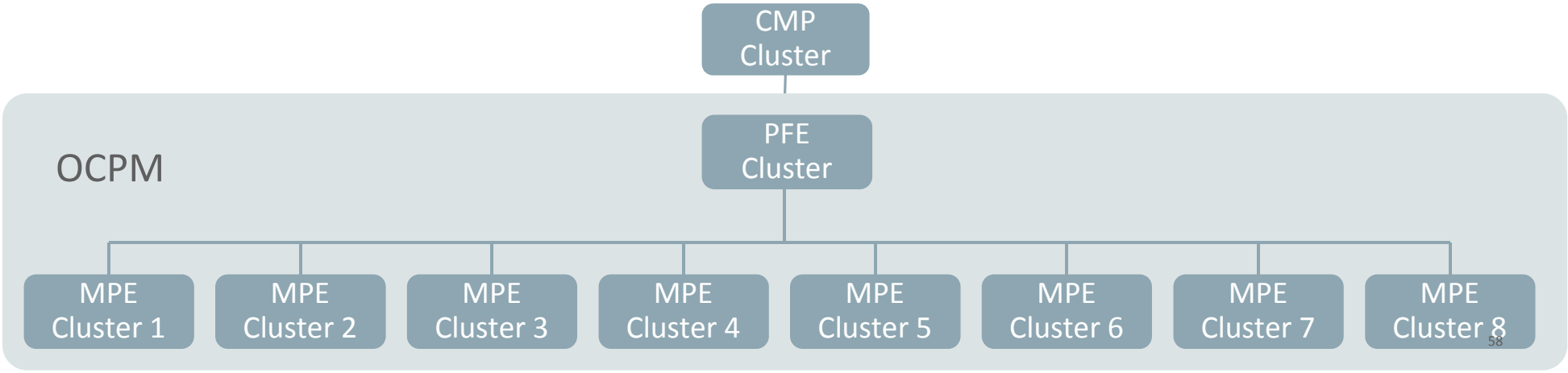
Scalability Requirements

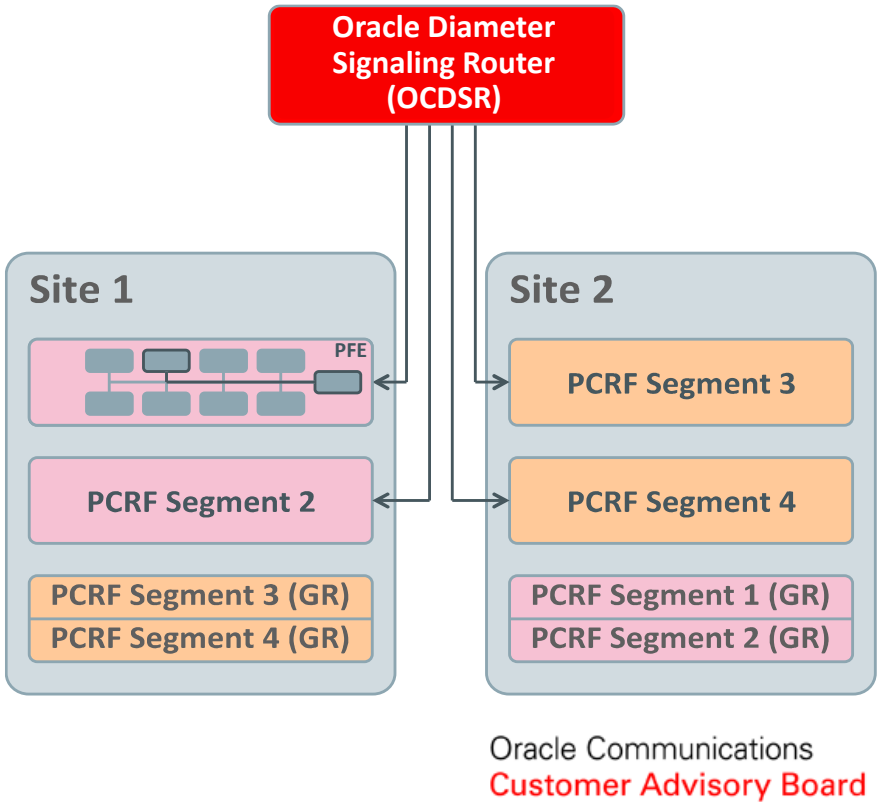
- Higher performance requirements drive scalability requirements
- Network functions must scale in a modular fashion
- Adding, removing or reconfiguring an element cannot impact other network elements



Voice Services and Policy System Geo-Redundancy

- Core network must be engineered to handle high volumes of traffic, including congestion management capabilities

- Multiple levels of redundancy
  - Element (blade) redundancy
  - Geographic redundancy



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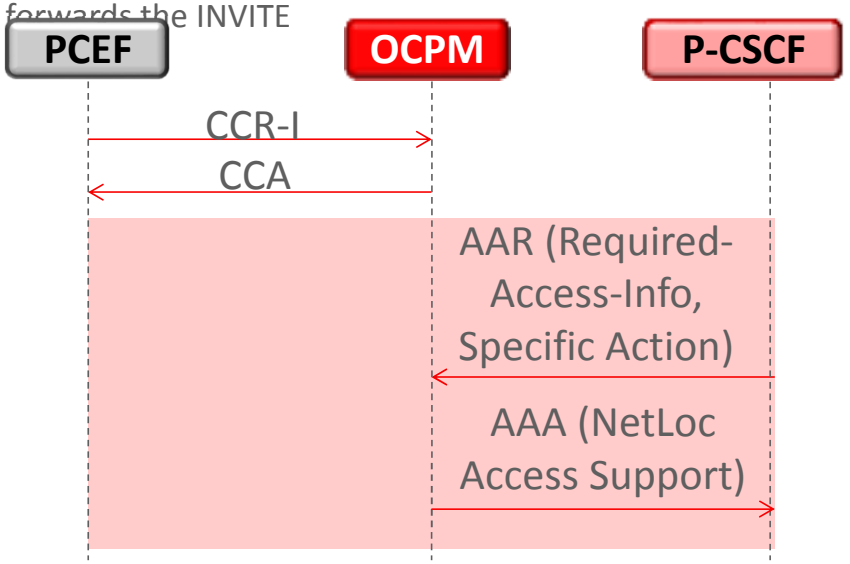
Network Provided Location Information (NPLI)-NetLoc

- Benefits
  - Allows operators to obtain location information via Rx interface and support Location-based services, Efficient call routing for emergency calls etc..
- How it works
  - P-CSCF receives INVITE and “holds” it while it sends an AAR to the PCRF and waits for its reply
  - PCRF provides geo-location of subscriber in AAA via 3GPP-User-Location-Information AVP, RAT-Type AVP
  - P-CSCF maps this info to the P-Access-Network-Information header, and forwards the INVITE
  - PCRF can also provide location information in RAR messages
- Standards Compliance – 3GPP TS 29.214

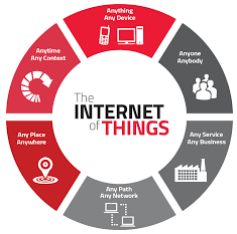


Moving Policy to 5G and Beyond

Needs for "Policy Decision" everywhere

- SaaS enablement layer
- Generic policy engine

- IoT Security
- Transfer negotiation
- Access selections
- Interaction with Mobile Core



Policy

- Sponsored Data
- Telemetry Services
- Background data xfer

- Enforcement Point
- Policy control usage exp.
- ANDSF Access selections
- Security policy

- Network Slice Section
- 5G IoT transfer Negotiation
- Flexible Mobile Steering in LAN
- Policy in Mobile Edge Computing

- Programmable Network
- Service Function Chain
- Flexible Mobile Steering
- Roaming Service

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Key Takeaways – Oracle Communications Solution

- Are part of Oracle's comprehensive portfolio designed to help IP CSPs attain revenue and cost goals for future gen services
- Leverage an integrated architecture that combines leading software
- Are defining the road to eventual CSP adoption of a fully virtualized, intelligently orchestrated network
- Make possible carrier quality applications development and deployment at scale

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Integrated Cloud

Applications & Platform Services


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