1200 G Street, NW
Suite 500
Washington, DC 20005

P: 202-628-6380
F: 202-393-5453
W: www.atis.org

Chairman
John Donovan
AT&T

First Vice Chairman
Nick Adamo
Cisco Systems

Second Vice Chairman
Thomas Sawanobori
Verizon

Treasurer
Joseph Hanley
Telephone and Data Systems

President & Chief Executive Officer
Susan M. Miller
ATIS

Vice President of Finance & Operations
William J. Klein
ATIS

November 18, 2011

Marlene Dortch
Secretary
Federal Communications Commission
445 12th Street, SW.
Washington, DC 20554

Re: Preserving the Open Internet; GN Docket No. 09-191 and WC Docket No. 07-52

Dear Ms. Dortch:

On November 16, 2011, representatives from the Alliance for Telecommunication Industry Solutions (ATIS) and its Network Optimization Focus Group (NetOp-FG) met with representatives from the Federal Communications Commission's Office of Engineering and Technology (OET) and Wireline Competition Bureau (WCB) to discuss ATIS' work regarding network optimization use cases.

ATIS provided an overview of its September 2011 NetOp-FG Assessment and Recommendation. As explained in the attached presentation, this report identified use cases associated with network optimization, including: (1) congestion-aware fairness; (2) subscriber/application-aware network optimization; (3) network-aware scheduling of content; (4) user rate plans; (5) reasonable network protection and management; (6) load- and policy-aware multiple radio access network selection; and (7) optimizing use of wireless non-bearer resources.

ATIS presented an overview of the application of each use case to optimize network capacity and user experience and identified critical enhancements to standards that may be beneficial to network optimization. ATIS also noted that the NetOp-FG Assessment and Recommendation was publicly available at no charge from the ATIS Document Center at: http://www.atis.org/docstore/default.aspx.

Attending this meeting on behalf of OET were: Walter Johnston, Chief, Electromagnetic Compatibility Division; James Miller, Senior Attorney Advisor, Electromagnetic Compatibility Division; and Michael Ha, Senior Engineer, Electromagnetic Compatibility Division. Attending this meeting on behalf of the WBC was Alex MacDonell, Senior Engineer.

Attending on behalf of ATIS and its NetOP-FG were: Tom Anderson, ATIS NetOp-FG Co-Chair and Director, Wireless Architecture & Evolution Service Provider CTO, Juniper Networks; Kevin Sparks, ATIS NetOp-FG Co-Chair and Director, Corporate CTO, Alcatel-Lucent; Joe Rostock, ATIS Vice President-Chief Technologist; Tom Payne, ATIS Director of Technology Programs; and Thomas Goode, ATIS General Counsel.

A copy of this letter and attachment are being submitted in the above-referenced dockets.

If you have any questions regarding this matter, please do not hesitate to contact the undersigned.

Sincerely,

Thomas Goode
ATIS General Counsel

Attachment

ATIS
Network Optimization Focus Group

Tom Anderson

Co-chair

Director, Wireless Architecture & Evolution Service Provider CTO, Juniper Networks

Kevin Sparks

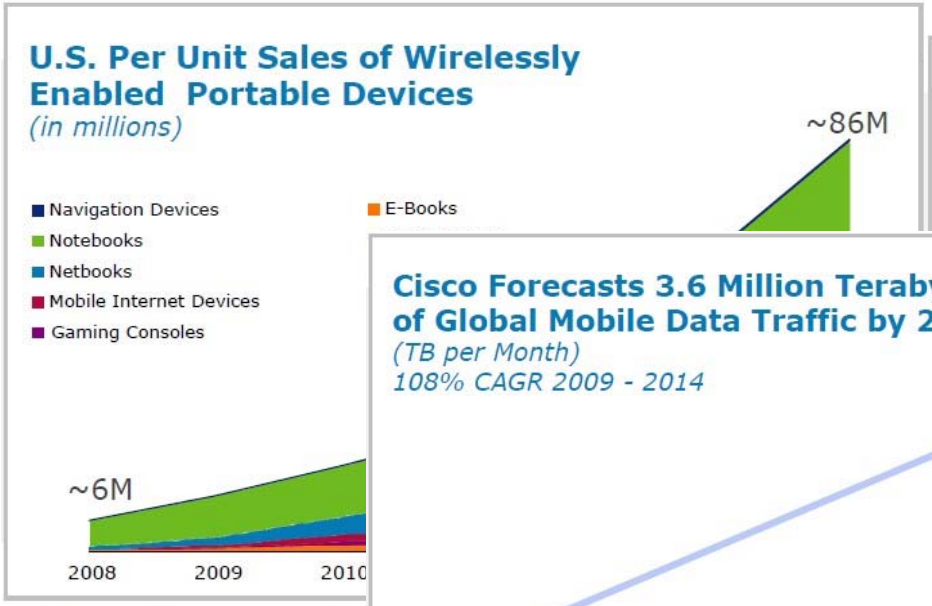
Co-chair

Director, Corporate CTO, Alcatel-Lucent

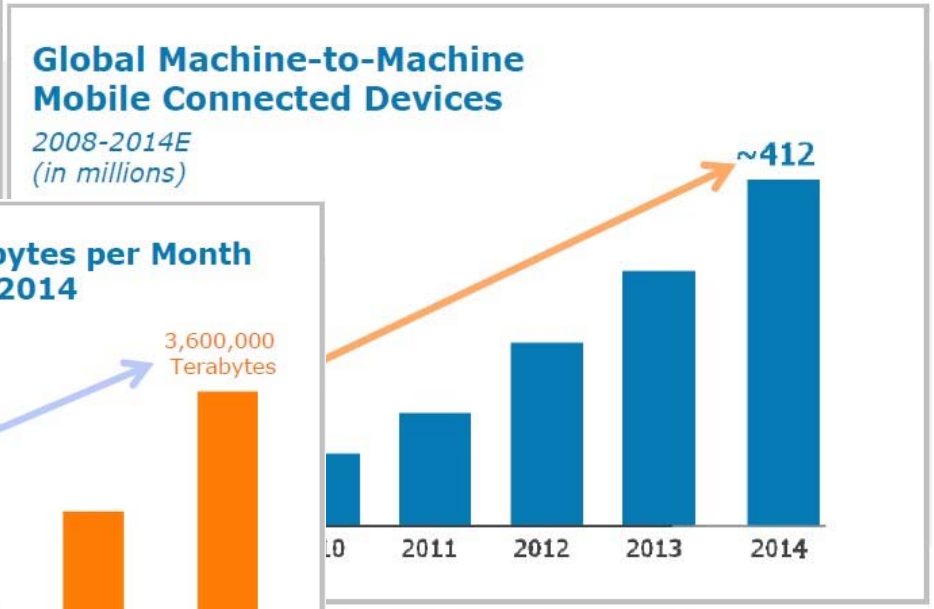
Network Optimization Focus Group (NetOp-FG)

- The NetOp-FG, chaired by Alcatel-Lucent and Juniper Networks, was launched September 2010 and had participation from 11 member companies:
  - ADTRAN
  - Alcatel-Lucent
  - AT&T
  - CenturyLink
  - Cisco
  - Ericsson
  - GENBAND
  - Huawei
  - Juniper
  - Symmetricom
  - Verizon
- The Focus Group finalized the report late August 2011 and is available for download on **www.atis.org**.

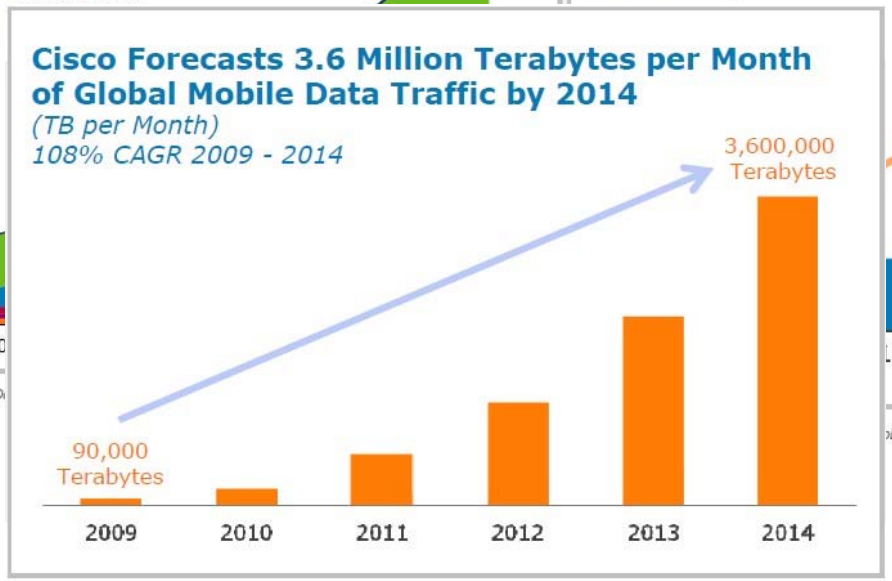
Devices, Interconnections & Traffic are Increasing Dramatically



*Source: Strategy Analytics, U.S. Connected D



bile and M2M Strategies 2009-2014, Jan. 2010



*Source: Cisco, VNI Mobile, 2010

New Network Optimization Methods and Standards Required to Efficiently Manage This Growth

ATIS NetOp Work Focused on Addressing Growth through Optimization

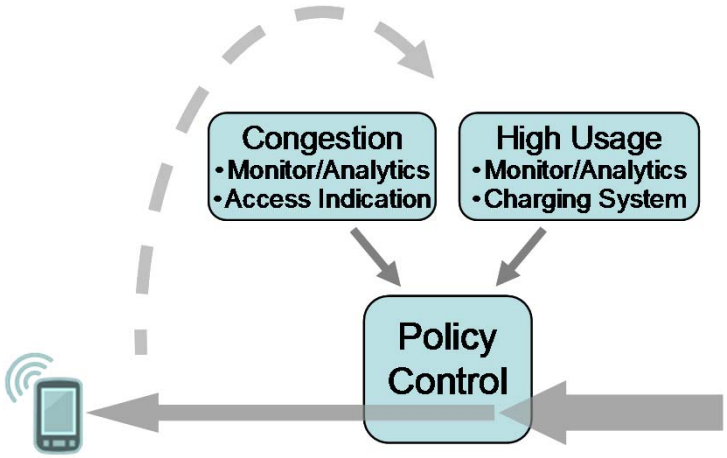
- Only industry group identifying broad range of detailed network optimization use cases:
  - Congestion-aware Fairness
  - Subscriber / Application Aware Network Optimization
  - Network Aware Scheduling of Content
  - User Rate Plans
  - Reasonable Network Protection and Management
  - Load and Policy Aware Multi-RAN Selection
  - Optimizing Use of Wireless Non-Bearer Resources
- A number of critical enhancements identified as areas for further standardization.
- Scenarios address Quality of Experience improvements as well as cost savings and revenue opportunities.
- Scenarios will be used to help establish a reasonable network management baseline with the FCC.

1. Congestion-Aware Fairness

Use Case Description

Summary: Optimization of network capacity usage to mitigate the impact of sustained heavy users during congestion peaks.

Benefit: Improved QoE (throughput, responsiveness) for normal users; greater fairness by factoring in longer-term (minutes-hours vs. msec-sec) sustained usage



Service/Business Needs

- Measurement of congestion levels in the network, and subscriber usage.
- Policy-based decision and enforcement during peak periods of congestion based upon correlation of data gathered above.
- Regulatory: Transparency of methods
- Cited in *Open Internet Order* as example of "Use-Agnostic Discrimination"

Gaps Analysis

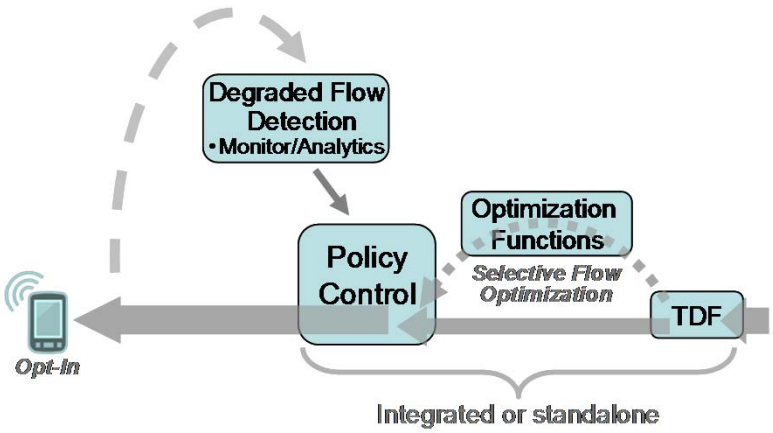
- Standard interface to PDF/PCRF to provide network & subscriber state.
- Extension to OCS-to-PCRF Sy interface required for OCS heavy user detection
- Improved congestion detection with direct RAN loading/congestion exposure
- ConEx is promising long term solution; significant IETF/3GPP progress required

2. Subscriber-/Application-Aware Network Optimization

Use Case Description

Summary: Per-user and/or per-application selective flow optimization (many forms)

Benefit: Enhanced user QoE (responsiveness, perceived quality, personalized features); Improved network utilization, service differentiation, facilitation of innovative 3rd party applications



Service/Business Needs

- Detection of specific flows
- Detection of degraded performance
- Policy control of optimization functions, per-user, per-application
- Regulatory: User opt-in; transparency and reasonableness of network management methods

Gap Analysis

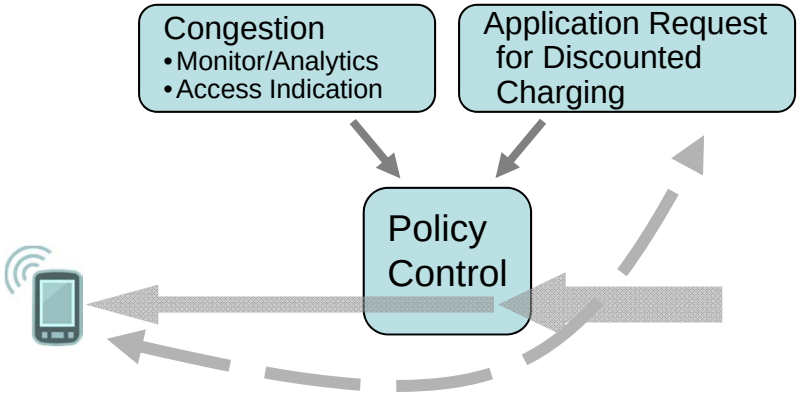
- Standard interface to PDF/PCRF to provide network & subscriber state
- Improved congestion detection with direct RAN loading/congestion exposure
- TDF "optimization index" for policy control of inline TDF functions

3. Network-Aware Scheduling of Content

Use Case Description

Summary: Network capability to enable deferral of traffic to less congested times using discount incentives for the user.

Benefit: Spreads traffic more uniformly in time reducing peak traffic needs while providing discounted billing to the user



Service/Business Needs

- Measurement of congestion levels in the network w/support for multiple access types
- Correlation of congestion level to subscriber's network path
- Support for multiple service provider configuration and NSP and 3rd party content
- Regulatory: Opt-in and transparency of incentive rates (like "night & weekend" rates)

Gap Analysis

- Standard interface to PDF/PCRF to provide network & subscriber state
- Improved congestion detection with direct RAN loading/congestion exposure
- Need for a re-try interval parameter to better manage repeated requests for deferred scheduling

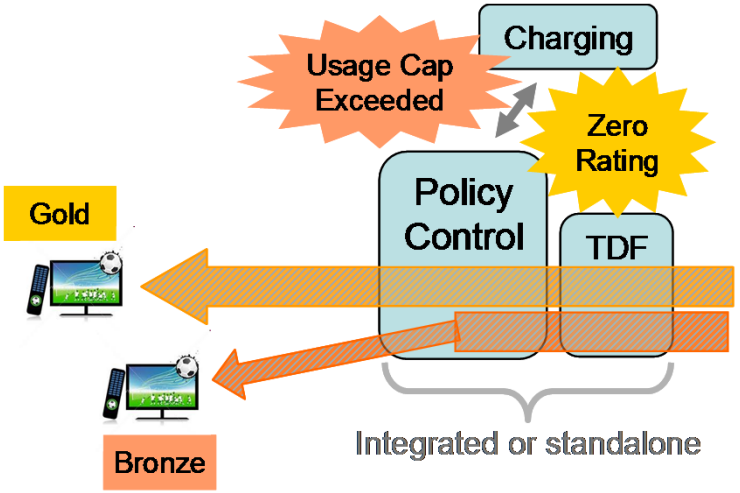
4. User Rate Plans

Use Case Description

Summary: Tiered service levels varying max bit rates, usage caps, and included content

Benefit:

- Restrains excessive usage of the network
- Better alignment between consumption and what users pay
- Facilitates monetization opportunities for operators & partners



Service/Business Needs

- Dynamic policy and charging rules
- Detection and zero-rating of included content
- Longer term: congestion-sensitive pricing
- Regulatory: Transparency of plan benefits and limits (opt-in is explicit with plan selection)

Gap Analysis

- Standards generally mature for factoring user tier into policy decisions
- ConEx is promising long term solution; significant IETF/3GPP progress required

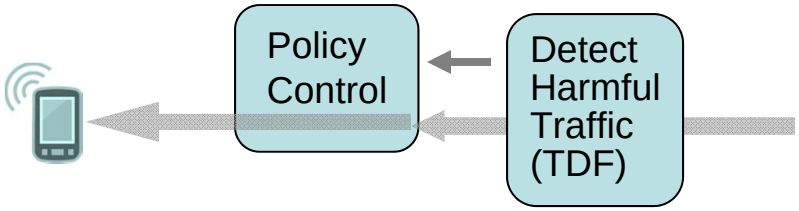
5. Reasonable Network Protection and Management

Use Case Description

Summary: Network optimization mechanisms are used to provide protection for the network and its users from harmful traffic .

Benefit:

- Increased network security and reliability
- Reduced network congestion by removing harmful traffic from the network
- Increased user and business/enterprise security



Service/Business Needs

- Network shall have the ability to detect harmful traffic (e.g., DoS attacks, malware, rogue user behavior, etc) and illegal traffic.
- Ability to quarantine and/or throttle the flow based on network policy.
- Regulatory: Consistency with ensuring network security and integrity, and addressing end-user un-wanted traffic

Gap Analysis

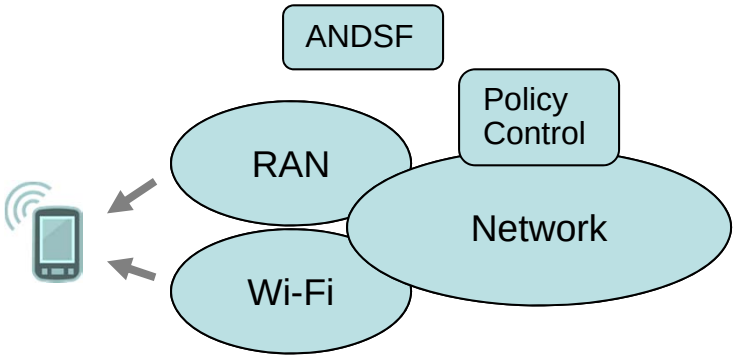
- No standards impact has been identified to implement the needed functionality.

6. Load and Policy Aware Multi-RAN Selection

Use Case Description

Summary: Use of logic in the device/client and/or the network(s), to flexibly determine which radio access network (e.g., 3G/4G or WiFi) plus the associated RF carrier or band would be most suitable for use.

Benefit: More efficient and fairer utilization of air interface and backhaul resources as well as improvements in user experience.



Service/Business Needs

- The access network must be able to monitor its loading level and/or available throughput
- The access network should provide an indication of load (or available throughput) to UEs, such that it can be used for network attachment decision purpose
- Regulatory: Opt-in of capability; consistent treatment of application classes; no blocking

Gap Analysis

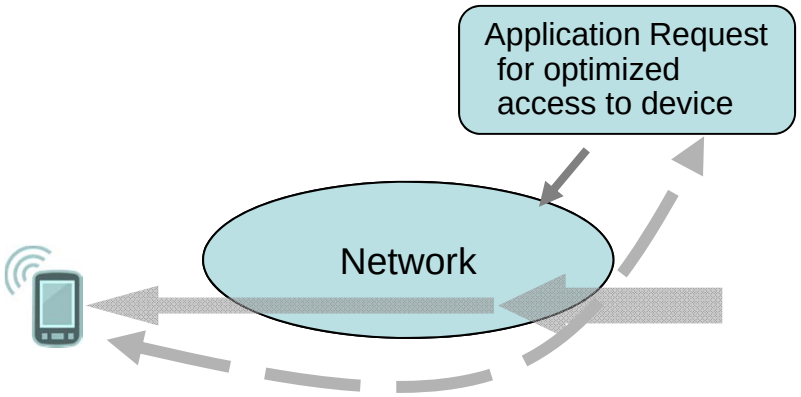
- Need ability to broadcast coarse grained available throughput to UEs
- Enhance ANDSF to utilize the access network availability information.
- Recommend UDC for ANDSF policies to enable coordination with PCC if needed

7. Optimizing Use of Wireless Non-Bearer Resources

Use Case Description

Summary: Smartphone applications and machine type communications (MTC / M2M) often impose different usage profiles than those associated with human communications, stressing the control/signaling plane of the network.

Benefit: Enable more scalable networks to better manage MTC and smartphone traffic.



Service/Business Needs

- Provide mechanisms to manage:
  - Restricted access to signaling resources
  - Very large numbers of devices
  - Congestion/overload controls, access restrictions
  - Low/no mobility wireless devices
  - Time scheduled applications and devices
- Regulatory: Transparency of any protective mechanisms that alter content or timing of application control or data flows

Gap Analysis

- 3GPP actively working MTC standards
- Standardization work required to provide optimized APIs between applications and the network to reduce signaling traffic and efficiently communicate with MTC devices

Regulatory Implications

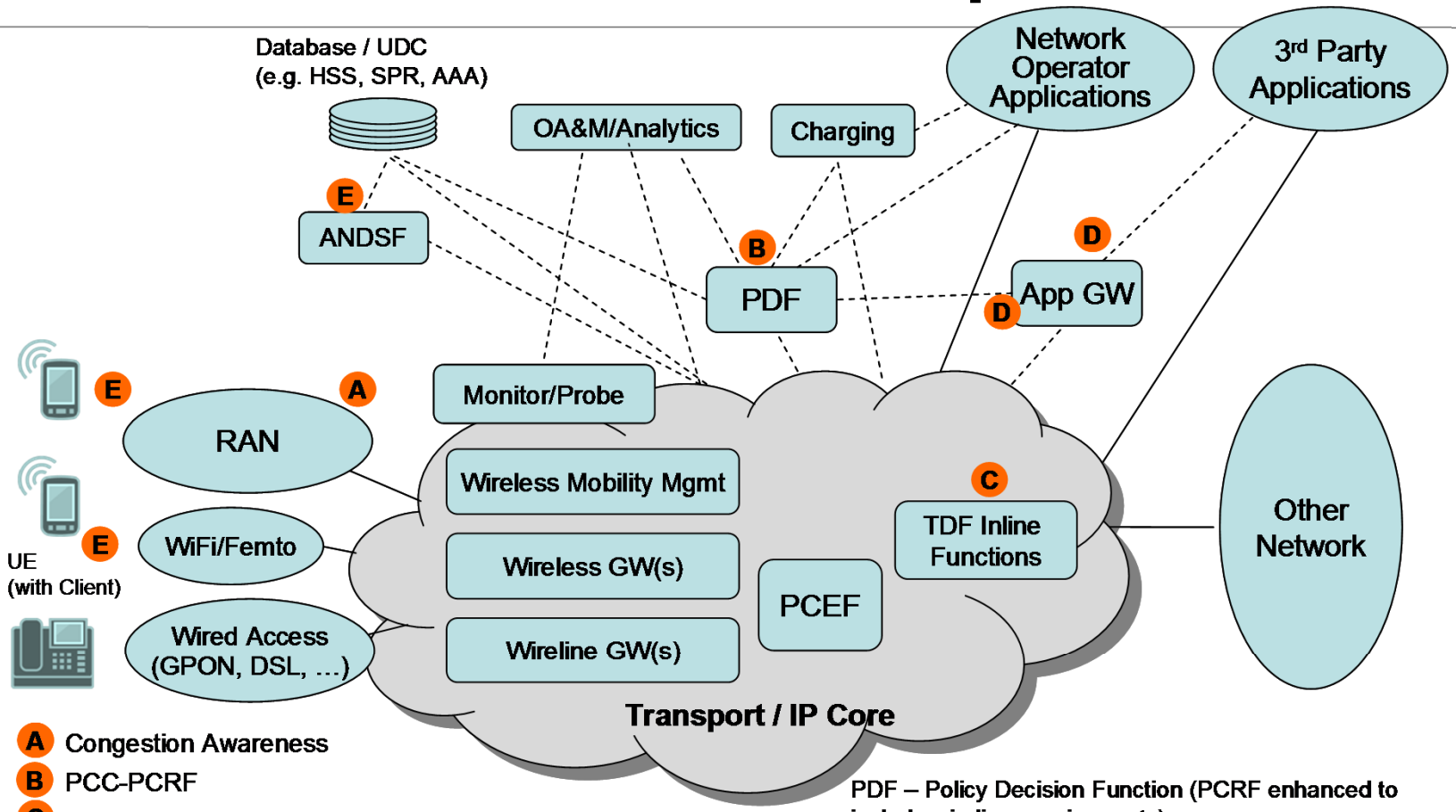
- In the US, net neutrality requirements are evolving and subject to further reconsideration/review/change.
- The use cases identified in this effort consider the current net neutrality rules,* which include three basic tenets:
  - **Transparency:** Fixed and mobile broadband providers must disclose the network management practices, performance characteristics, and terms and conditions of their broadband services;
  - **No blocking:** Fixed broadband providers may not block lawful content, applications, services, or non-harmful devices; mobile broadband providers may not block lawful websites, or block applications that compete with their voice or video telephony services; and
  - **No unreasonable discrimination:** Fixed broadband providers may not unreasonably discriminate in transmitting lawful network traffic.

* FCC's Open Internet Order - released on December 23, 2010

Areas for Standards Development

AREA	ITEM	Use Cases
Congestion Awareness	• Need better mechanisms to communicate congestion attributes to network control entities across the E2E network (e.g. radio access network load) • Need for continued analysis of and standardization efforts on CONEX and its alignment with Network Optimization	1, 2, 3
PCC - PDF	• Need for new interface on PDF/PCRF to provide network & subscriber state as inputs to policy control. • Extension to OCS-to-PCRF S_y interface needed, to use charging system for heavy user detection	1, 2, 3, 6, 7
PCC - TDF	• TDF enforcement actions should include a operator -defined application-specific user priority (optimization index) for inline TDF functions	2, 5
App/Network Interfaces	• Need to continue analysis of the standardization effort on API between application and network/device to reduce signaling traffic, including M2M. • Extensions to network APIs (OSA/Parlay -x/RESTful) to enable requests for reduced charging rate connections for content scheduling, and extension to the Rx interface and network APIs for a minimum re-try interval.	3, 7
Access Selection	• Recommend use of UDC for ANDSF policies to support better coordination with PCC subscriber policies. • Enhance ANDSF to allow the UE to utilize the access network availability information. • Need a mechanism to inform UE of coarse-grained access network availability at time of attachment.	6

Areas for Standards Development



- **A** Congestion Awareness
- **B** PCC-PCRF
- **C** PCC- TDF
- **D** App/Network Interfaces
- **E** Access Selection

PDF – Policy Decision Function (PCRF enhanced to include wireline requirements)
PCEF – Policy & Charging Enforcement Function
RAN – Radio Access Network
TDF – Traffic Detection Function

Dotted Lines – Key Control Relationships

Conclusions

- The study explored a wide range of network optimization use cases, identifying the required service capabilities, various implementation options, regulatory considerations, and areas recommended for further standards development.
  - Use cases broadly represent network optimization that is of interest to the industry today—bringing real value to end users, service providers, and network operators alike.
- Most of the use cases rely on policy management infrastructure to invoke and control optimization actions in the network.
  - As a result, this work builds on the output of the ATIS Policy Management Focus Group (PM-FG) and extends it into application layer interactions.

Conclusions (cont'd)

- Regulatory aspects are an important consideration in implementing any use case that alters the way the network responds to traffic demands.
- This Report has looked at how use cases could be impacted by the FCC December 2010 order on net neutrality.
- After careful consideration, the team's conclusion is that the methods considered here can be made consistent with net neutrality rules, provided that proper opt-in mechanisms and transparent disclosure of network management methods are dutifully provided.
  - It is important, however, that companies looking to implement network optimization methods seek guidance from their own regulatory counsel before implementing any mechanisms.

Supplemental Material

Recommendations

Short-term Standards Needs

- The following ATIS Focus Groups/Committees should address the issues raised in the corresponding use cases:
  - **M2M-FG (Machine-to-Machine)**: The *Optimizing Use of Wireless Non-Bearer Resources* use case deals with limiting the control plane impacts of M2M applications, which should be incorporated and extended in the work of the M2M Focus Group.
  - **PTSC (Packets)**: Several NetOp-FG use cases may be relevant to ongoing work in the PTSC, including: *Congestion Aware Fairness*, *Subscriber-/Application-Aware Network Optimization*, and *Reasonable Network Protection and Management*.

Recommendations (cont'd)

Short-term Standards Needs (cont'd)

- **PRQC (Performance Quality)**: The *Congestion-Aware Fairness* use case may be relevant to ongoing work in the PRQC.
- **WTSC (Wireless)**: Several NetOp-FG use cases may be relevant to ongoing work in the WTSC, including: *Congestion-Aware Fairness*, *Subscriber-/Application-Aware Network Optimization*, *Load- and Policy-Aware Multi-RAN Selection*, and *Optimizing Use of Wireless Non-Bearer Resources*.
- **CSF (Cloud)**: Several NetOp-FG use cases may be relevant to ongoing work in the CSF, including: *Subscriber-/Application-Aware Network Optimization*, and *Network-Aware Scheduling of Content.*

Recommendations (cont'd)

Short-term Standards Needs (cont'd)

- **3GPP** - Many of the use cases in this study use network state, and especially mobile network congestion indications, as a primary factor for invoking network optimization actions.
  - Recent initiatives within 3GPP to provide such inputs into the PCC architecture have not been accepted.
  - It is one of the top recommendations of this Focus Group that ATIS member companies and the industry as a whole work toward a consensus on the value of exposing congestion information in the network and use of network congestion information in policy decisions (e.g., PCC and/or ANDSF) for optimization purposes.

Recommendations (cont'd)

Short-term Standards Needs (cont'd)

- **OMA** - A number of use case implementations require APIs between the network and third party applications, and/or between the network and end user devices.
  - Further work in applicable SDOs such as the OMA is needed to detail the API functional needs of network optimization use cases.
  - The NetOp-FG analysis highlighted needs in the areas of deferred content scheduling and reduction of M2M signaling traffic.

Recommendations (cont'd)

Longer-term Standards Needs

- **IETF** - In the longer term, holistic congestion management approaches such as the IETF ConEx approach hold great promise for aligning application needs, user priorities, and network charging, policing, and overall congestion management in a comprehensive way.
  - The NetOp-FG recommends that ATIS member companies actively encourage and advance the ConEx concept, especially in the areas of wireless RAN-specific aspects, as well as consistent and practical end-to-end congestion volume-based incentive/enforcement regimes.
  - IETF ALTO (Application Level Traffic Optimization) was also identified as a network optimization mechanism.

ATIS Committee and Forums

- M2M FG – Machine-to-Machine Focus Group
- CSF – Cloud Services Forum
- NetOps FG – Network Optimization Focus Group
- PRQC – Network Performance, Reliability and Quality of Service Committee
- PTSC – Packet Technologies and Systems Committee
- WTSC – Wireless Technologies and Systems Committee