5G App Optimization: GSMA Internet Working Group Proposal

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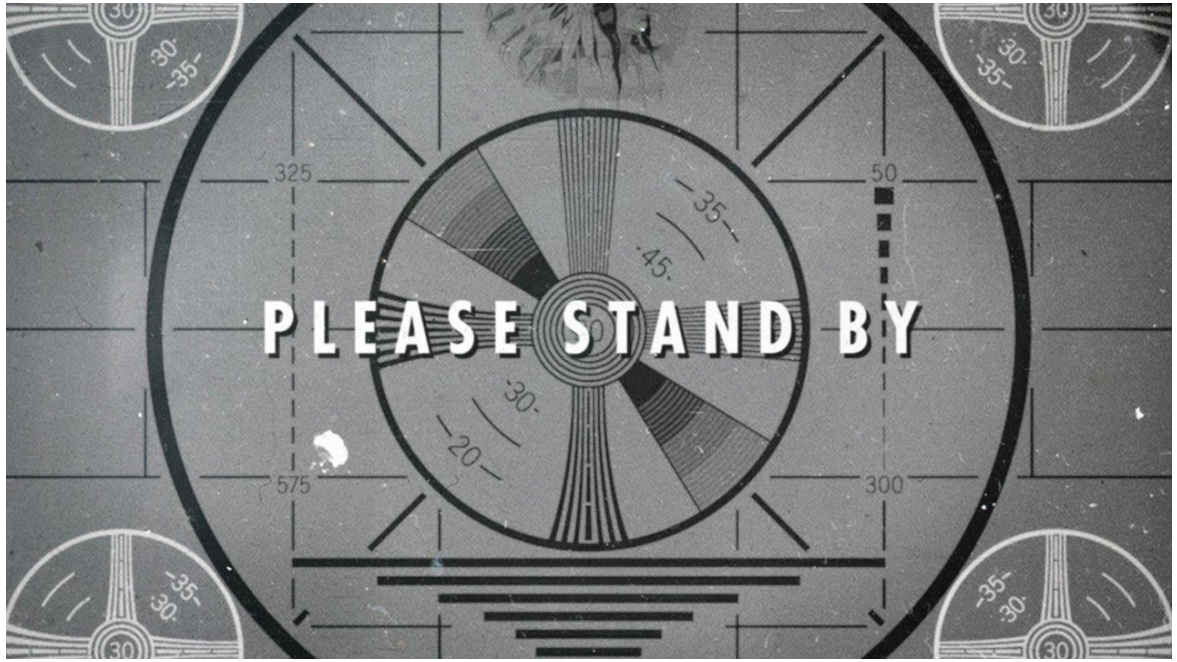
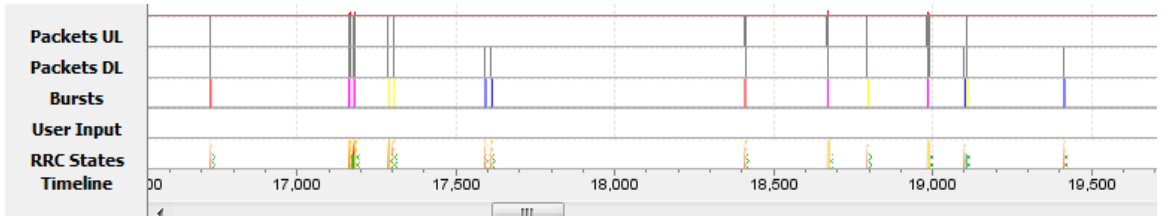
Problem Statement – Learning from the Past

- When mobile applications exploded in at launch of 4G, **developers did not understand fundamental concepts of mobile networks**.
- Many popular apps were **highly inefficient** and created poor user experiences and overloading of mobile networks.

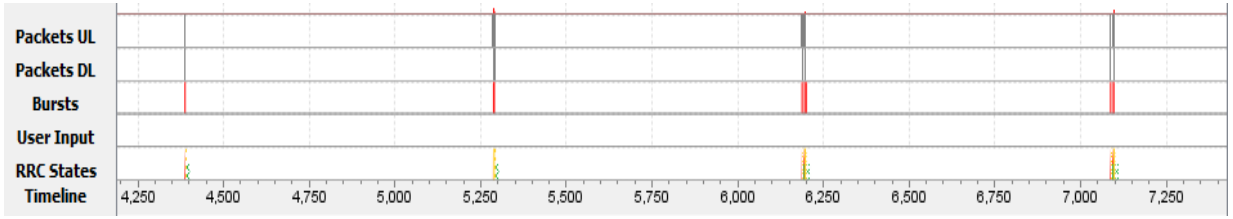


Cautionary Tales

- A very popular streaming application was **not compressing text files** that contained subtitles – OPTIMIZED to get 17% data savings on iOS.
- A very popular music streaming app was **not compressing** and repeatedly sending down metadata files that listed every song on every channel – OPTIMIZED to reduce the 45% metadata.
- A very popular video streaming application sent down **oversized 1MB thumbnails** of movie posters when users browsed – OPTIMIZED to increase load time by 3 seconds.
- A very popular sports application was **not caching** the logos for certain sports teams – OPTIMIZED to reduce data use and improve load time.
- A very popular social application was **turning the radio on seven times** for every background update – OPTIMIZED to saver user battery life.



Radio on for ~75 seconds every 30 minutes



Radio on for ~37 seconds every 30 minutes

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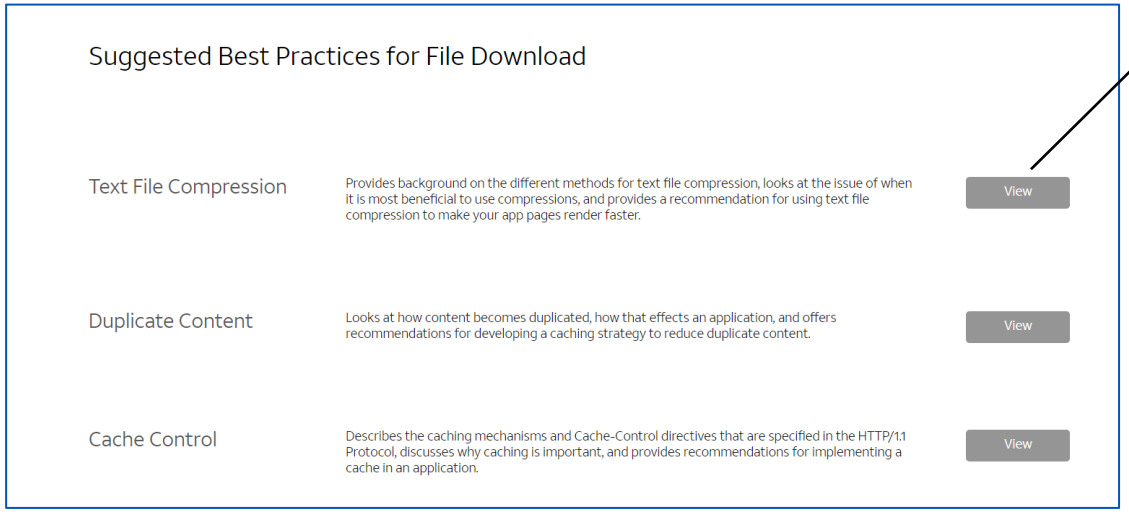
Daylighting Best Practices for 4G

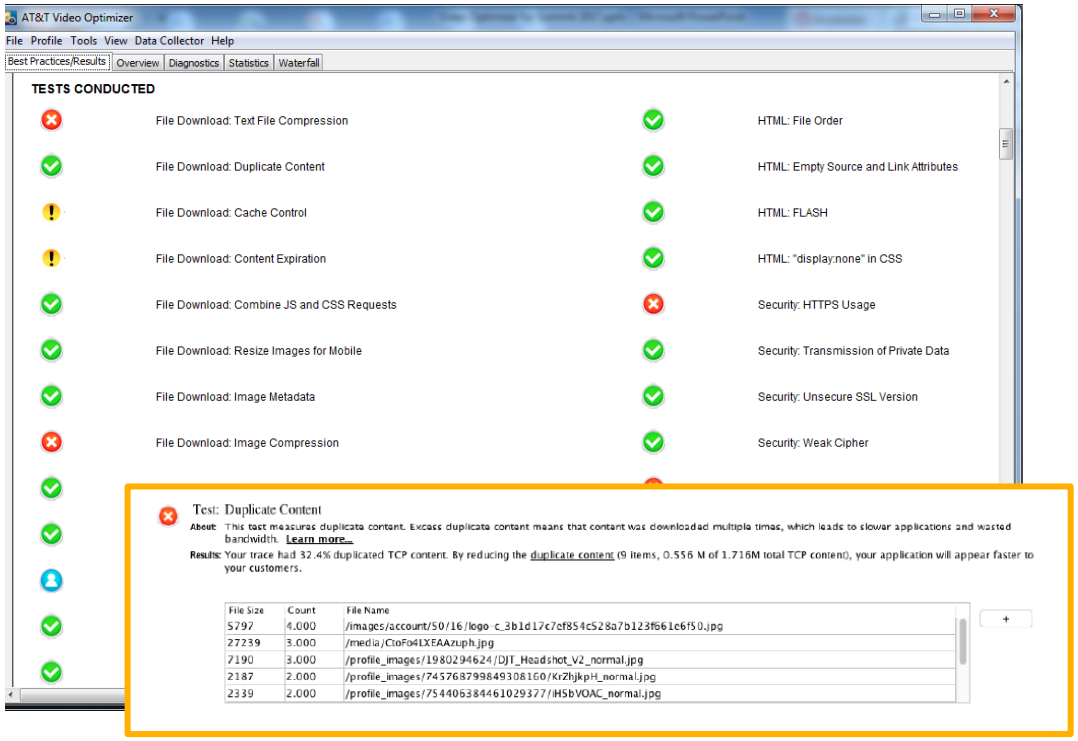
- AT&T Labs-Research team studied a number of applications and worked with a developers to understand problems and create an evolving set of Best Practices for Mobile Applications
- The work was widely publicized through the AT&T Developer Program starting in 2011.
- Examples:



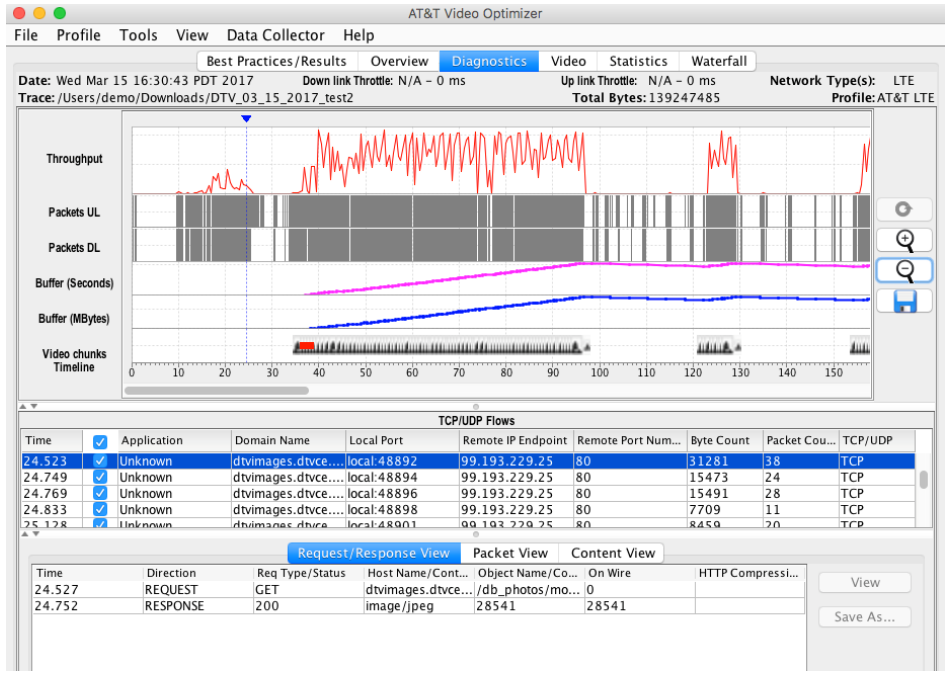
https://developer.att.com/video-optimizer/docs/best-practices

Instrumenting Best Practices

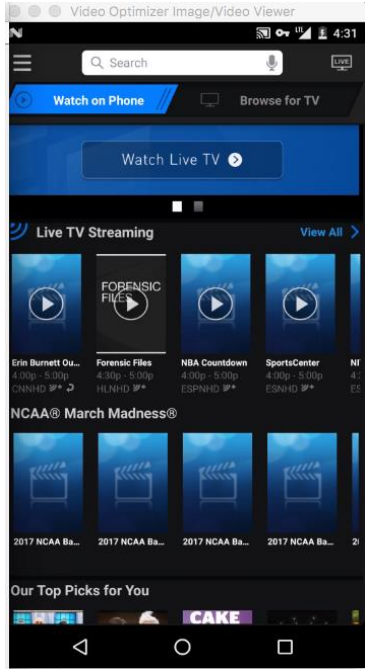
- AT&T Labs-Research team created a tool, initially known as **AT&T Application Resource Optimizer (ARO)** and later rebranded as **AT&T Video Optimizer (VO)**.
- This Open-Source tool captures application traces, determines if Best Practices are followed, and enables visual analysis of issues.



Best Practices Results Pane



Analysis Pane



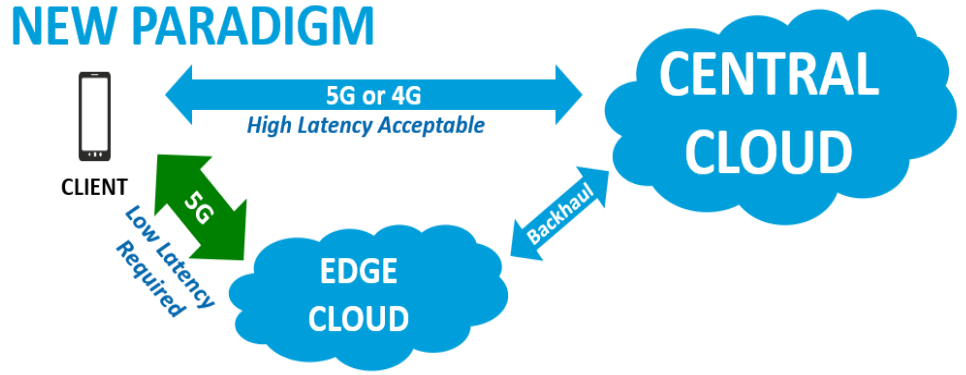
Screen Capture

Accelerating the 5G Ecosystem

The **4G/LTE** App Ecosystem has matured - **most major apps have optimized**.

However, **5G will present significant new challenges** for developers:

- **Ultra-low latency** use cases (inter-vehicle communication, 'real-time' kinesthetic apps, XR)
- Balancing **Edge vs Central** Cloud Architectures



GSMA Work Item Proposal

Initiate a work activity focused on:

1. **Best practices** for a new class of applications that will take advantage of the ultra-low latency provided by emerging 5G Networks.
    1. Identify and document high level 5G application patterns
    2. Map the discovered patterns to recommended best practices highlining potential benefits/gains

2. **Tools and Test techniques** that will enable developers of these ultra-low latency applications to more easily take advantage of 5G network capabilities and deploy these applications in a way that creates a predictable user experience and minimizes negative impacts on mobile networks.

5G Application Best Practices

Emerging 5G networks and edge computing will enable classes of mobile applications that have been **previously impossible**. These previously unimagined applications will utilize ultra-low latency to respond in 'human' time, enabling a new class of kinesthetic and XR applications.

With few real "5G Applications" deployed, **there has not been adequate time or focus to create a cannon of Best Practices**.

The work item will investigate learnings from 5G applications that have been or expected to be deployed across the globe and develop a set of Best Practices that can be then shared openly across the ecosystem.

5G Application Tools and Test Techniques

This Work Item will **evaluate tools available in the application ecosystem and develop a strategic plan** for how these tools could be extended to test applications for the 5G Best Practices developed in the first work item.

In particular, **the work item will focus on tools that will help assure that 5G applications utilize the network efficiently**, without causing issues that would impact other users.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