

Spec-Guide Capacity Planning:  
Charter Internal Note.  
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# 1 Capacity Planning, an Introduction

In 2019 Spectrum Guide is growing quite aggressively. In January we were at approx. 1.8M STB in production, and by the end of December we are projected to reach 6.7M STB supported. With growth of over 3x in one year the scalability of systems needed to be reassessed. The majority of Spectrum Guide systems were designed and/or built out at expected scale, but some assumptions in those projections haven't been re-examined since build, some assumptions made to build Spec-Guide systems have been lost to time, and since build out the environment has changed in ways that may have broken those assumptions.

The following components have been identified to be assessed.

1. Central Session Manager (CSM)
2. Stitcher
3. Scaler Cluster Manager (SCM)
4. Scaler
5. Proxy
6. Cookie
7. Content
8. Universal Data Collector (UDC)
9. Advanced Messaging Solution (AMS)
10. Transport Stream Broadcaster (TSB)
11. Oracle Databases
12. Spec-Guide QAM bandwidth
13. Hypervisor resource availability
14. Microservices

As guidance to the project the following outline was defined, and analysis performed for each section as it was relevant (or not) to that component.

1. Introduction
  - (a) What does it do?
  - (b) How does it scale with customer count/content provided/other growth?
  - (c) how does it interact with adjacent systems that might cause a constraint?
  - (d) Are there any common/known reasons for failure to be addressed (tech debt)?

2. Where we stand today (assessed individually on a market/kma/service group level where appropriate)
  - (a) Memory consumption
  - (b) Disk space utilization
  - (c) Networking usage
  - (d) Application performance
  - (e) Other known tech debt that will surface in the short term (6 months)
  - (f) Plans to address tech debt
3. Where we will be by EOY 2019 - 6.7M devices
  - (a) Memory consumption
  - (b) Disk space utilization
  - (c) Networking usage
  - (d) Application performance
  - (e) Expected effects of addressing tech debt
  - (f) Other short term mitigation strategies & requirements
4. Where we will be by EOY 2020 - 10M devices
  - (a) Memory consumption
  - (b) Disk space utilization
  - (c) Networking usage
  - (d) Application performance
  - (e) Long term resolutions & requirements
5. Where we will be by EOY 2023 - 15M devices
  - (a) Memory consumption
  - (b) Disk space utilization
  - (c) Networking usage
  - (d) Application performance
  - (e) Long term resolutions & requirements
6. Outline of mitigation and resolution strategies
  - (a) Costs/timelines/steps of mitigation strategies and long term resolutions
7. Conclusion

## 2 Limitations of Operations Based Capacity Planning

Spec-Guide infrastructure was, in many respects, built at scale. Because of this it became easy for developers and engineers in the past few years to assume that computational resources were plentiful and resource management wasn't an immediate concern. New feature development was prioritized, and because we weren't at scale yet, computational resources that were built in order to support growth were instead used to support expanded features. Through 2019 we are at the very beginning of identifying the ways in which feature development and growth will run up against the inherent scalability of the Spec-Guide infrastructure as it was architected. In some ways scalability of the platform is trivial, while in others it can be prohibitively expensive.

As the operations team performing this analysis we don't have visibility into new features under development. This constitutes a blind spot in this analysis, and consequently in needed resource allocation/acquisitions. Similarly growth metrics supplied have not supplied broken down regional growth, only growth of the enterprise as a whole. As an example it is unknown to what extent growth in TWC markets will be higher than in L-CHTR markets because of legacy guide system conversions. Similarly TWCHI and BHN markets are expecting to take customers in the coming year, but expected growth for each market is unknown.

These concerns demonstrate the interdependency of the product, development, and operations teams in the success of the spectrum experience. Any analysis that involves the future of Spec-Guide that is contained to within only one vertical will inherently be of limited applicability. Any long term solution to scalability will need to be found in the cooperation of these teams either in a more DevOps style environment, or by a dedicated joint effort.

### 3 Conclusion

The documents that follow were created for each component of the Spec-Guide architecture, and describe the current needs of the platform based on known growth and usage as implemented in 2019. In several cases technical debt prevented/continues to prevent accurate capacity planning due to resources being unnecessarily used. For example, a memory leak on the TSBs prevents our ability to understand the memory utilization of a healthy TSB. Similarly logrotation on stitchers, scalers, and proxies needed to be addressed before disk space could be assessed for those components. Many of the documents that follow highlight important pieces of technical debt which may present scalability issues or issues in our ability to assess scalability. These concerns represent risks to the Spectrum Guide platform, and to the continued success of the Spectrum Guide experience.