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TIA / QuEST Forum

A STUDY OF TL 9000 BENCHMARK DATA FOR EARLY SOFTWARE PROBLEM REPORTS AND SOFTWARE FIX QUALITY MEASUREMENTS

A CALL FOR INCREASED TL9000 CERTIFICATION TO IMPROVE ICT INDUSTRY SOFTWARE PERFORMANCE

TIA / QuEST Forum

November 15, 2024

Topics for Today

- Why Study TL 9000 Software Measurements Now?
- What Was Studied – Focus on packet switching?
- Early Software Problem Report (eSPR) and Software Fix Quality (SFQ) Measurements Defined
- Problem Report and Software Fix Defined
- eSPR (Critical, Major and Minor) Trends
- eSPR Product Category Specific Trends
- SFQ Trends
- Conclusions and Recommendations

Why Study TL 9000 Software Measurement Benchmarks Now?

A recent TIA analysis (put in link to white paper) highlighted the increasing need for an ICT Quality Management System such as TL9000:

- Numerous recent industry outages
- Affecting millions of consumers of SW applications, social media, mobile, cloud and cable
- The Recent CrowdStrike outage alone impacted 8.5M windows devices
- And required labor intensive fixes with an estimated business impact of $5 Billion + many lawsuits
- An “early” software problem due to a SW update caused the CrowdStrike outage
- Analysis showed TL 9000 requirements could have reduced the outage risks
- Quantitative analysis of TL 9000 benchmark data showed how traditional “Telecom” industry TL 9000 certified organizations have been able to measure and improve their performance and reduce risks
- With the blurring of IT /Telecom, greater reliance on SW, TL 9000 benefits must expand to all of ICT

TL 9000 early Software Problem Reports and Software Fix quality measurements and benchmark data provide the ICT Industry the ability to monitor and improve its performance.

What Was Studied?

Early Software Problem Reports (Critical, Major, Minor)	**Software Fix Quality**	**Time Period Covered**	**Packet Switch Product Family Product Categories with significant numbers of certifications**
• eSPR1 • eSPR2 • eSPR3	• SFQ	• 2 years (Sept 2022 – Aug 2024)	• 1.2.2.1 Wireline (7-9 certifications during the study period) (e.g. Access or ATM switches, gateways) • 1.2.9.1.1 Legacy Core Routers (7-8) (e.g., IP or multi-service core router) • 1.2.9.2.1 Legacy Edge Routers (12-14) (e.g., IP edge router) • 1.2.9.3 Access (9-10) (e.g., Access router)

About Early SW Problem Reports and SW Fix Quality

Early Software Problem Reports (ESPR)

- **Simply defined as the number of early SW problem reports per customer per year**
- Tracks software problems that are found and reported by a customer's early deployment of a software release **during the first 12 months of General Availability**
- Segmented into Critical (eSPR1), Major (eSPR2) and Minor (eSPR3) SW problem reports
- SW problem reports may have a negative impact on the organization (e.g. rework), on the customer (e.g. backing out, re-installation) and may reduce end-user loyalty and revenue.

Software Fix Quality (SFQ)

- **Simply defined as the percentage of software fixes that are determined to be defective within the first 12 months of deployment**
- Used to assess the effectiveness of an organization's software fix processes.
- The goal of the measurement is minimizing customer risks of failure when introducing fixes to an in-service software release

TL 9000 Problem Report and Fix Definitions (1/2)

Problem Report

- A report from a customer or on behalf of the customer concerning **a product or process defect requesting an investigation of the issue and a resolution to remove the cause**. The report may be issued via any medium. Problem reports are systemic deficiencies with hardware, software, documentation, delivery, billing, invoicing, servicing or any other process involved with the acquisition, operation, or performance of a product. An incident reported simply to request help to bring back the service or functionality to normal without the intent to investigate and provide a resolution to the cause of the incident is not a problem report.

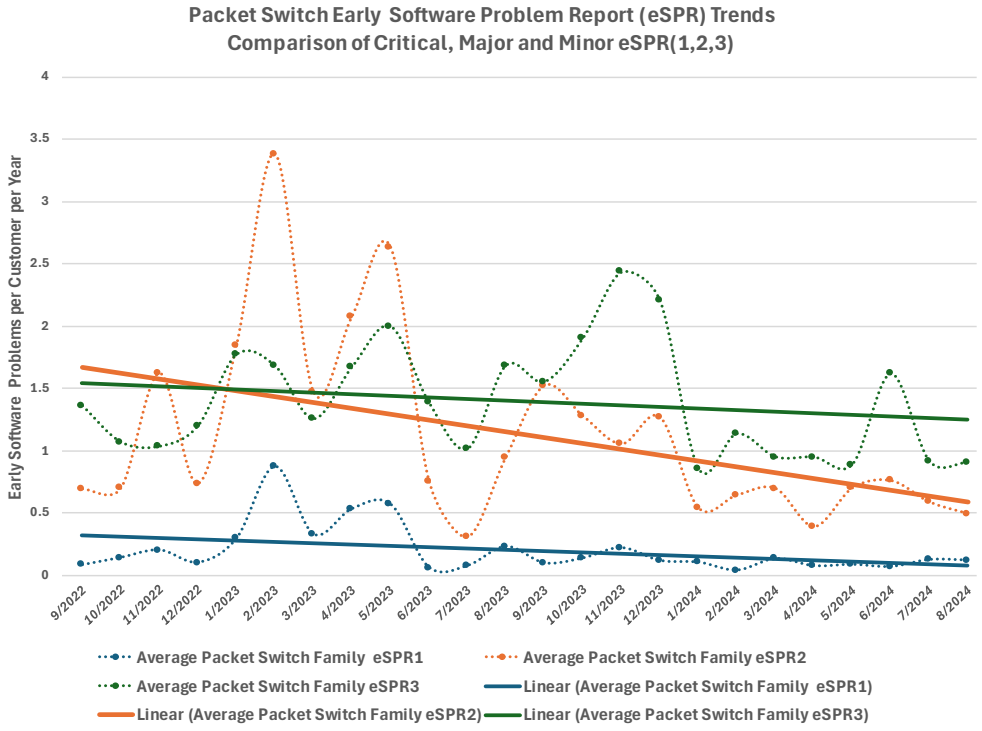
Critical Problem Report

- **Conditions that severely affect the primary functionality of the product** and because of the business impact to the customer **requires non-stop immediate corrective action**, regardless of time of day or day of the week as viewed by a customer on discussion with the organization such as
  a. product inoperability (total or partial outage),
  b. a reduction in the capacity capability, that is, traffic/data handling capability, such that expected loads cannot be handled,
  c. any loss of emergency capability (for example, emergency 911 calls), or
  d. safety hazard or risk of security breach.

TL 9000 Problem Report and Fix Definitions (2/2)

Major Problem Report	Minor Problem Report	Software Problem Report	Software Fix
Product is usable, but a condition exists that seriously degrades the product operation, maintenance or administration, etc., and requires attention during pre-defined standard hours to resolve the situation. The urgency is less than in critical situations because of a lesser immediate or impending effect on product performance, customers and the customer's operation and revenue such as a. reduction in product's capacity (but still able to handle the expected load), b. any loss of administrative or maintenance visibility of the product and/or diagnostic capability, c. repeated degradation of an essential component or function, or d. degradation of the product's ability to provide any required notification of malfunction. Critical Problem	Other problems of a **lesser severity than 'critical' or 'major'** such as conditions that have little or no impairment on the function of the system.	A problem report due to a fault in program code, design of data structures or firmware	A software change delivered or made available for delivery to the field to correct a problem(s).

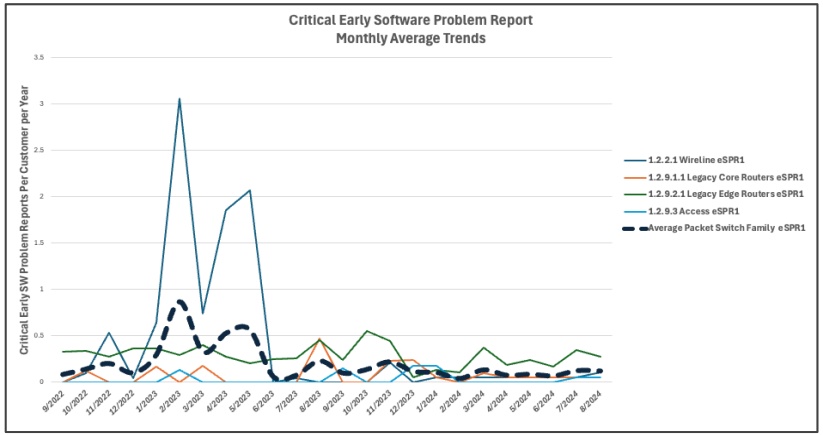
Overall Packet Switch Product Family Critical, Major and Minor Early Software Problem Reports Trending Downward

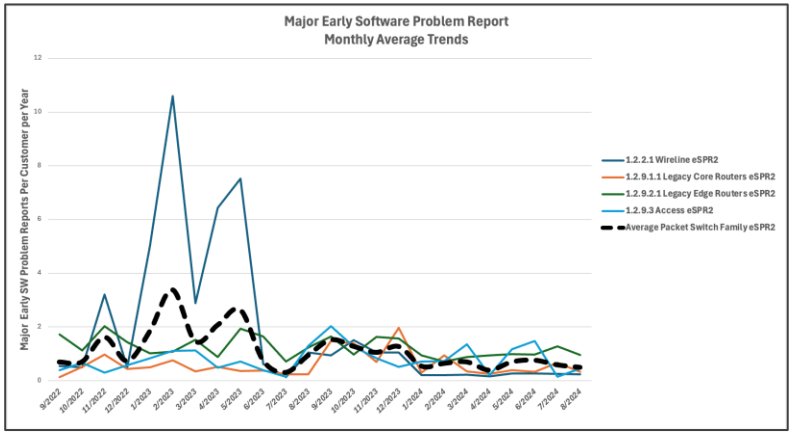


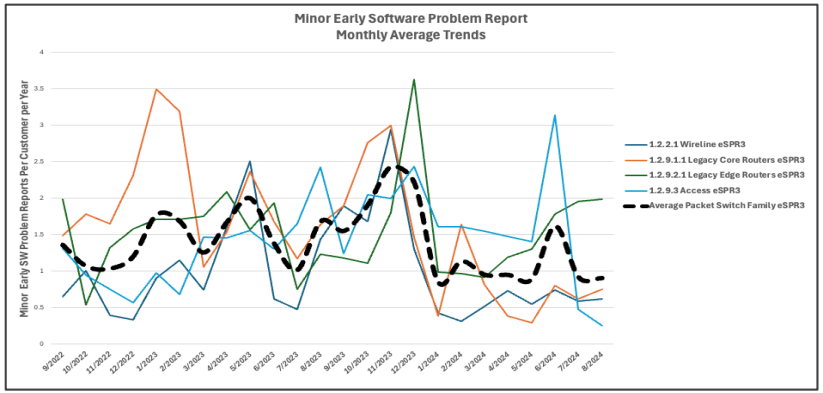
- As expected, eSPR is generally highest for minors, with majors second and criticals the least
- Trend line reductions over 2-year period:
  - Majors (eSPR2) had the greatest improvement (~62%), with a reduction of about 1 major/customer-year
  - Minors improved (~22%), with Criticals slightly trending downward at .2 - .3 criticals/customer-year

Bottom Line:
Overall Good News for Packet Switch Customers of TL Certified Organizations that now have less impact from early software problems

Product Category View for Critical, Major and Minor eSPR

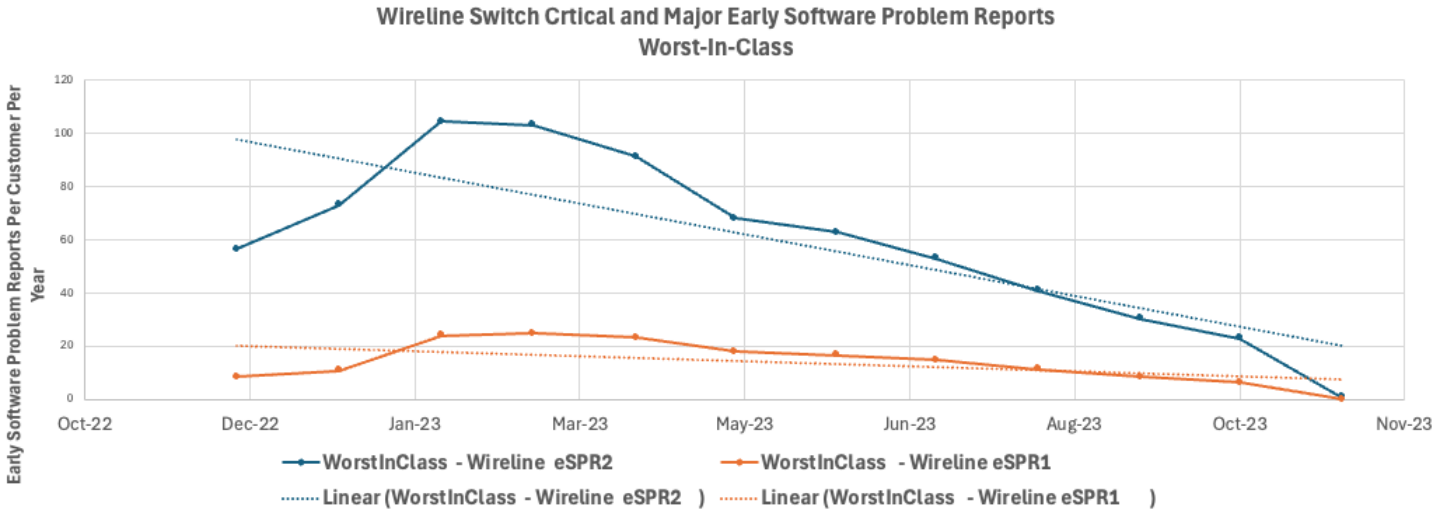






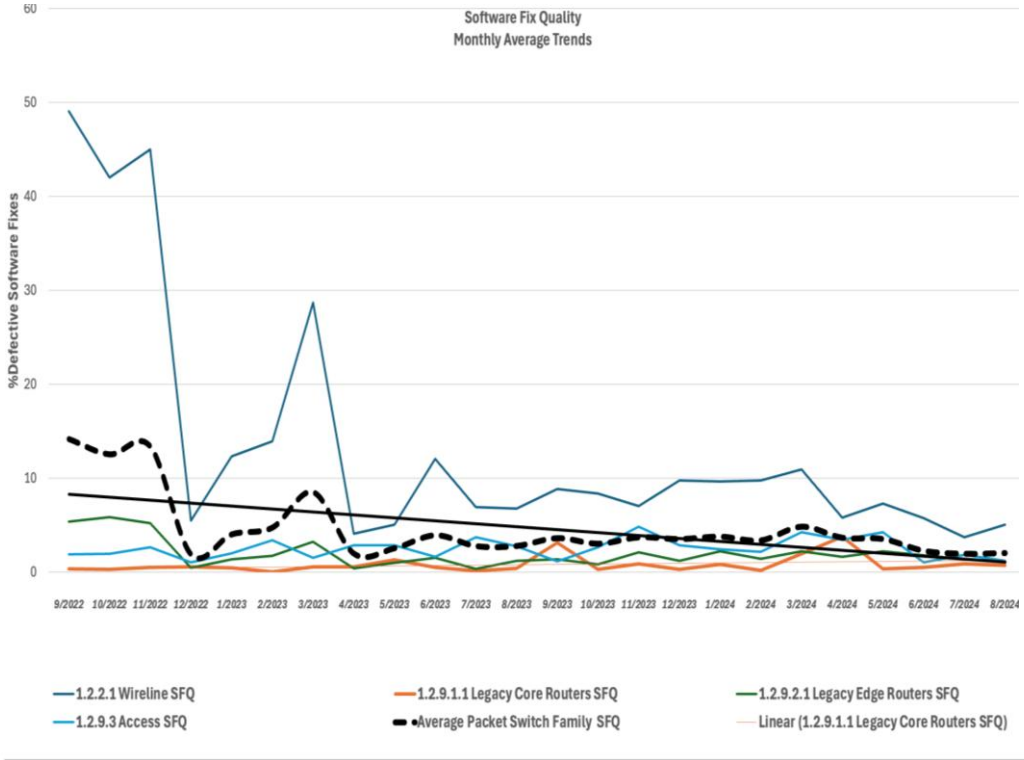
- Wireline packet switch eSPR performance is responsible for major peaks for both criticals and major averages
- No clear trends for Minor eSPR with all four product categories having large swings between a range of about .5 to 3.5 problems/customer-year

Wireline Worst-in-Class (WIC) eSPR1&2 Performers Are Driving The High Monthly Averages Seen for This Product Category



- Extremely High Major (>100) and Critical (>20) Early SW Problem Reports/Customer-Year Observed
- Both eSPR 1 & 2 WIC improved significantly
- These reductions likely responsible for the overall improvements seen in the monthly average trends

Overall Packet Switch Product Family Software Fix Quality Initially Poor for Wireline, but Trended Significantly Downward



- Wireline SFQ
  - Very high at close to 50% near the beginning of the study period!
  - But improved by ~ 90% over the period
- Edge Routers started with a high of 6% but improved significantly to 1-2%
- Access generally flat and within a range of 1-5%
- Core Routers generally low (< 1%) and flat, with a couple of peaks near 3%

Bottom Line:
Though there is an overall downward trend, SFQ performance is not consistently where it needs to be, and can be very poor at times

Conclusions and Recommendations

- ✓ **eSPR and SFQ TL 9000 measurements are valuable in monitoring ICT software quality performance**
- ✓ **TL 9000 Benchmark data trends for eSPR and SFQ demonstrate improved performance for TL 9000 Certified organizations in the packet switching family**
  - Majors (eSPR2) had the greatest improvement (~62%), with a reduction of about 1 major/customer-year
  - Minors improved (~22%), with Criticals slightly trending downward at .2 - .3 majors/customer-year
  - SFQ shows an overall downward trend, but performance is not consistent and very poor at times (spikes at 50%!)
- ✓ **Consider performing analysis of other key TL 9000 product categories**

Reaffirms The Time is Right to Elevate TL 9000 and Its Deployment Across the Entire ICT Industry.

Join Us In Our Efforts to Further Advance and Evolve the TL 9000 QMS to New Heights.

THANK YOU

Speaker Name

Speaker Title