

CASE STUDY

Automotive Bluetooth Transmitter



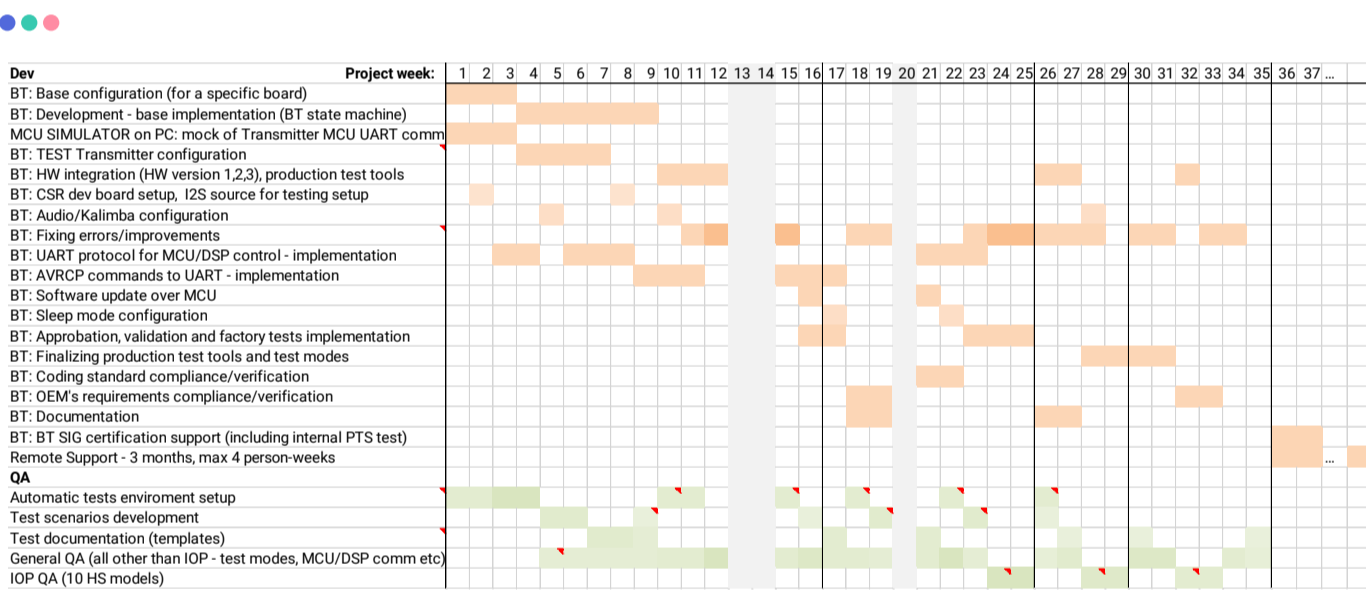
Challenges

- Highest quality standards for automotive project
- Scope not completely defined at the beginning of the project
- Innovative solution with four Bluetooth modules in a single device
- Project divided into software and hardware modules developed by different companies
- Timeline and scope changes during the project

Project Scope

- **System architecture, Bluetooth firmware design, MCU to Bluetooth module protocol design**
- **Implementation of Bluetooth transmitter module** software in line with transmitter release plan. Software update over MCU, UART protocol for MCU/DSP implementation, audio/DSP configuration, Bluetooth state machine, AVRCP support, test modes
- Deliverables: binaries, software release notes, software code, software documentation, test results, error reports
- **Transmitter MCU mock simulator** (UART communication for testing)
- Complete and **independent project management** including setting up development environment for Comarch tasks
- **Hardware review** and **support in resolving HW issues**
- **Complete QA.** Unit testing (full coverage), sanity testing, performance and stress testing, functional testing, protocol testing, interoperability testing
- Continuous integration system and tests automation
- SonarQube for testing MISRA standard compliance
- **BT SIG certification support** (including internal PTS test)
- **Delivering documentation** for implemented SW and related processes
- **Onsite workshops**, hardware prototypes bring-ups (four HW versions)
- Project started with **incomplete scope**, flexible approach to delays in the project caused by HW delays

Project Plan



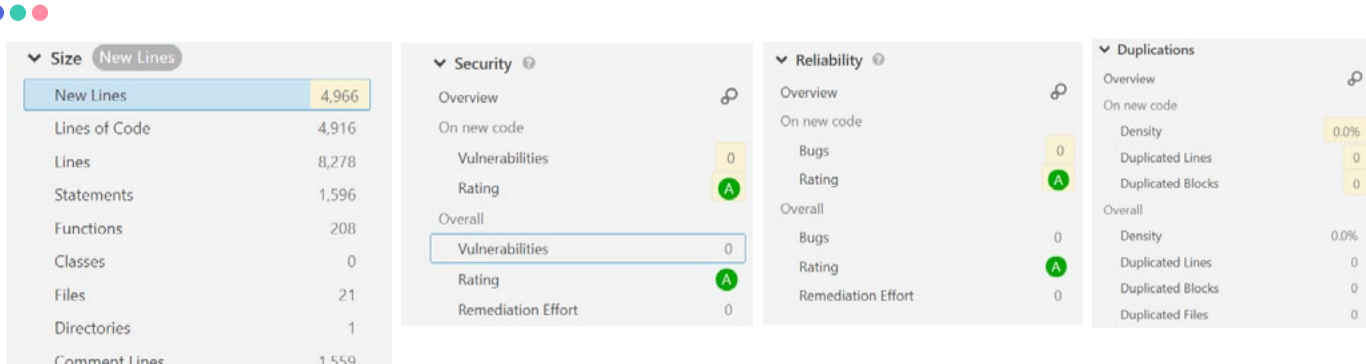
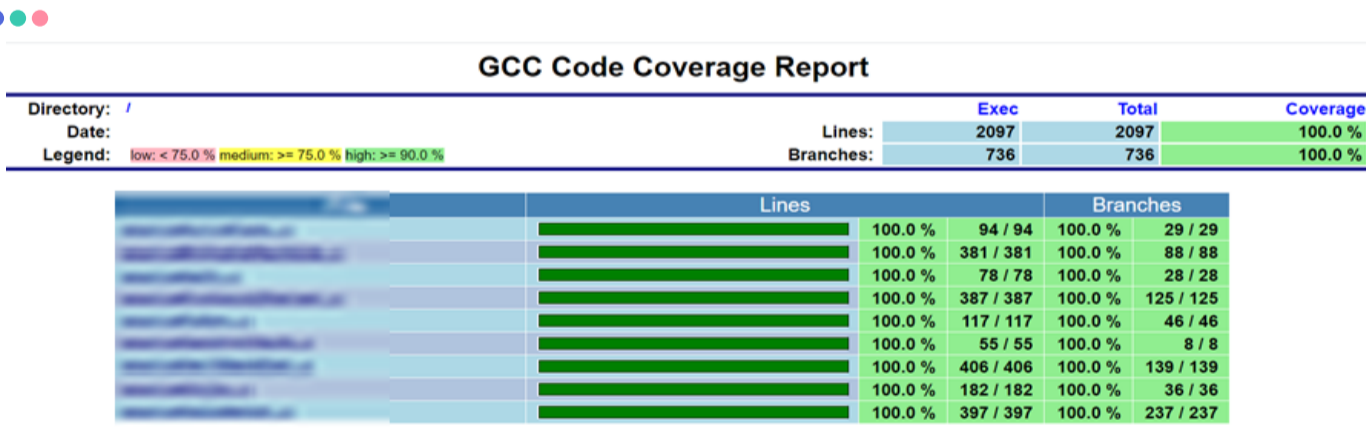
Project Metrics

Tasks in Jira

Tasks in JIRA: 491
Development tasks (sub-tasks not included)

Tasks in JIRA for IOP testing: 689
Project included: 11 test plans, 70 test case templates (about 50 as core tests). In total, 689 test plans, test case templates and test cases were executed with devices from the market

Source Code Complexity, Unit Tests, Statical Analysis



- Reliability** - Issues in this domain mark code where behavior other than expected is possible
- Security** - Issues in this domain mark potential weaknesses to hackers

Automated Test Setup

- **80 keywords** – a keyword is like a function or block used to build a more complex test case
- **98 test cases** – tests are categorized in 20 groups depending on tested functionality
- Test run needs **1.5 hours**. Locally, it is possible to run a whole group of tests or one specific test

Result

- Comarch's partner accepted final delivery
- Comarch and its partner resolved all challenges, expected and unexpected
- Comarch developed high-performance software compliant with automotive standards