COMARCH

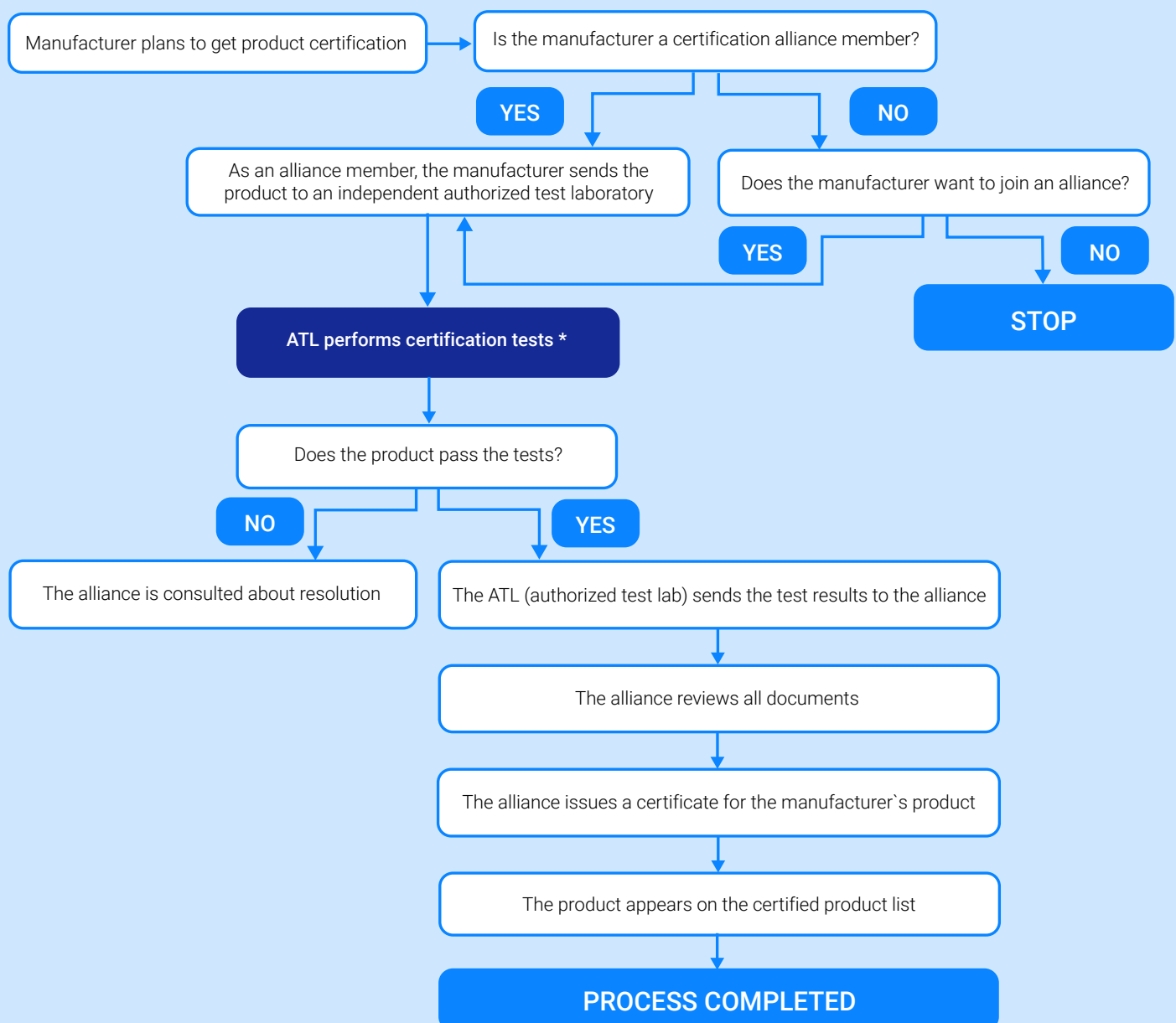## Improving the Technology Certification and Standardization Process with Comarch Automated Test Framework

The main challenges of the certification process

There are many reasons why manufacturers join alliances that create certification programs for their technologies. First and foremost, certified devices provide end-users with confidence that the product is reliable and compliant with the specification created by the organization. It also ensures the correct behavior of the product and reduces maintenance costs, preventing the product from failing after the purchase, when it is more expensive to repair. Certified devices receive an easily recognizable mark of quality and often get priority focus in promotional activities of an alliance. However, before these benefits are granted, the certification body has to develop specialized test tools, which are used, for example, by an independent authorized test laboratory. This process consumes a lot of time, human and financial resources.

For that reason, certification organizations often find themselves in need of support by a test tool vendor, who acts as a trusted partner with good understanding of the challenges with which new and mature alliances have to deal daily. The process of certification itself, as well as the process of choosing the test tool vendor and the implementation of a tool, have different stages to pass through.

Certification process flowchart

Manufacturer plans to get product certification

Is the manufacturer a certification alliance member?

YES → As an alliance member, the manufacturer sends the product to an independent authorized test laboratory

NO → Does the manufacturer want to join an alliance?

YES **NO** → **STOP**

ATL performs certification tests *

Does the product pass the tests?

NO → The alliance is consulted about resolution

YES → The ATL (authorized test lab) sends the test results to the alliance

The alliance reviews all documents

The alliance issues a certificate for the manufacturer`s product

The product appears on the certified product list

PROCESS COMPLETED

* this flow doesn't take into account selfcertification processes

Selection and implementation of test tools vendor – step by step

1

Test specification – created by the certification organization or sometimes by the test tool provider, who writes it on the basis of strict standard specifications requirements. The biggest challenges related to this phase are hassles related to the versioning of the test specification and the lack of tool which ensures control over the entire development process.

2

Test case specification – at this stage, it is important to determine what test will be available, what will be the test subject, what scenarios will be considered and what the desired test results are.

3

Request for quotation – sent by certification alliances in order to select a test tool provider. Organizations usually look for a vendor with extensive experience and understanding of the certification environment, who is able to offer guidance and partnership.

4

Test tool development – after the final selection of the supplier, the development phase begins. From the vendor, this requires the highest level of flexibility, close cooperation with the certification organization, advanced preparation and implementation of schedules, and extensive knowledge of a given technology (standard).

5

Test tool distribution – this phase varies depending on business models: the distribution process can be financed by members of the certification organization or co-financed from the common budget of the alliance. In some cases, the test tool is distributed by its vendor, who applies a licensing fee to its users.

6

Conformance testing – verifies whether the product performs according to its specified standards.

7

System maintenance – the provider receives bug reports from the ATLs and users, then verifies whether they concern products/ devices or the test tool itself.

8

New test cases implementation – after the specification process is closed and test tools are released to the market, there are usually new test cases that need to be flexibly deployed to an already fully developed and validated test tool.

The most common problems faced by certification organizations

The certification process is a sophisticated mechanism requiring expertise in several specialized areas such as:
• test specification creation
• test cases creation
• test tool development – standalone or in the cloud.

Worth mentioning are also test automation systems development and pre-testing execution. The success of standardization depends on implementation of test scripts and unification of test results, system integration and maintenance. Certification organizations, especially at the beginning of a new technology adaptation, often lack experience in one or more of the above-mentioned areas. They also search for solutions that allow the test tool to be adapted to their specifications, while ensuring high stability.

Seven most common challenges/obstacles which may occur and need to be overcome to successfully finish the certification process:

Lack of any test tool
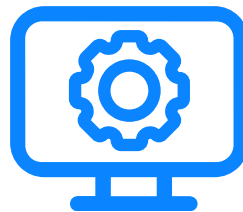
Having a test tool but without the rights to it

Tests are hardcoded into the test tool and every change requires a new version of the tool

Each tool generates results in a different format
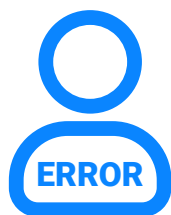
High risks of human error while performing manual tests

Long time required to implement a test tool
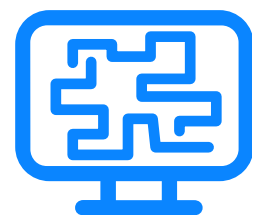
Complicated and difficult certification process

Is there any easily-accessible solution?

At Comarch, we understand these challenges. As part of our IoT ecosystem, we have developed test tools for numerous organizations using various technologies and meeting different requirements. In recent years, our experienced members of the team dedicated to working on certification-related projects have successfully delivered solutions for the most recognizable certification alliances. The experience we have gained over the years has allowed us to develop the **Comarch Automated Test Framework, which consists of ready-made components of a technical solution to be used in test tools in order to shorten the development time and ensure the high stability and maturity of the tools that Comarch develops for alliances.** The high flexibility of the CATF and the number of available features allow easy adaption and application of the solution.

Comarch Automated Test Framework – one answer to multiple problems

Problem	Solution	Benefits

Problem

Lack of any test tool

Having a test tool but without the rights to it. Tests are hardcoded into the test tool and every change requires a new version of the tool

Each tool generates results in a different format

High risk of human error

Long time required to implement a test tool

Complicated and difficult certification process

Solution

COMARCH AUTOMATED TEST FRAMEWORK

Benefits

Using a ready-made solution. Lower cost thanks to not creating a new tool from scratch

Changing existing tests and adding new ones

All results produced in one, consistent file format

Level of automation that allows launching from the command line, e.g. for nightly tests

Re-using an existing tool with innovative architecture

Considerably faster execution

A closer look at Comarch Automated Test Framework

Comarch Automated Test Framework is Windows-based software developed in .Net C# that can work with Python test scripts via the Pythonnet package. One of its greatest advantages is displaying the UI to the end-user with all the functions needed to perform tests, such as configuration, test execution and presentation of results.

CATF also provides console access in order to run tests automatically, and allows you to pause the test flow in the event of a failure, which becomes useful when a need for debugging a device under test arises. Moreover, its architecture includes a sequencer that is responsible for managing, selecting, and running (single, group or all) test cases written in scripts. Using CATF, you can modify or even add test cases – in such cases, the final report includes a warning describing the modifications to the test scripts. For security reasons, the final test report is generated in a ZIP file with a secure digital key.

Useful features of CATF (Comarch Automated Test Framework)
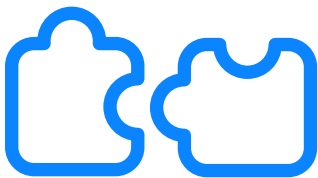
Modular architecture that makes it easy to adjust and upgrade the test tool to the latest standards updates

Lower costs of creating test cases and maintaining test tools
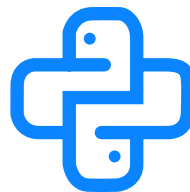
The ability to write test cases in Python

Automatic versioning and common format of test scripts
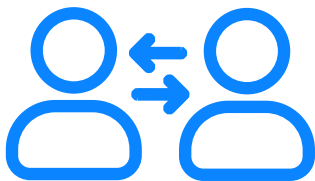
Comprehensive documentation and support for users of the test system

The possibility to perform pre-certification test runs in the development phase
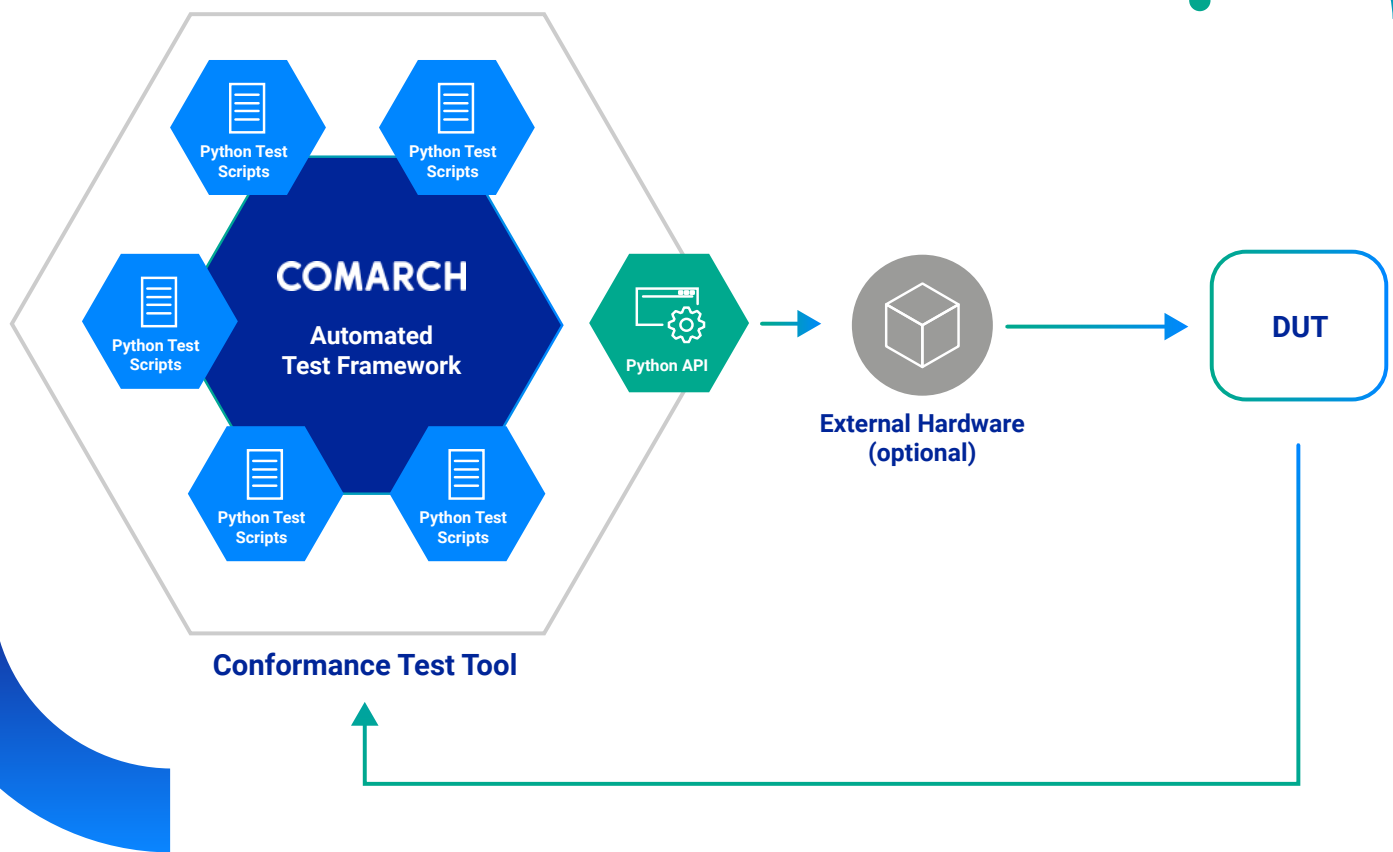
Sophisticated and easy-to-use logs viewer and interpreter

Environment for IOP Testing

Solution architecture

Conformance Test Tool

Elements in diagram:
- Python Test Scripts (x6)
- COMARCH Automated Test Framework
- Python API
- External Hardware (optional)
- DUT

Other improvements in the certification process that can be made with the use of Comarch Automated Test Framework

For alliance members/entire certification organization:

1. **Easier, faster and more reliable certification** of the device

2. **Significant reduction of time to market** for products

3. **Constant support** for engineers via a support package

4. **Competitive advantage** by early access to the test tool

For authorized test labs:

1. Becoming **one of the first authorized labs** for the given standard

2. **Gaining knowledge** from the early stage of a given certification process

3. **Readiness for on-site assessment** while becoming an authorized lab for the standard

4. **Support** from the test tool vendor

Use Cases

MAC Conformance Test Tool For FiRa Consortium and their UWB technology

Comarch has created the MAC Conformance Test Tool allowing FiRa to launch a certification program which ensures that devices conform to test specification IEEE 802.15.4z (HRP block-based mode ranging technologies).

In this project, there were three main challenges:

- The development stage of the UWB standard was primary, which meant limited knowledge about the FiRa organization and uncertainty as to the direction of this development
- The scope of the project was also demanding and required the development and adaptation of software and hardware
- As always, we also dealt with timeline and technical limitations due to the early stage of the test scenarios development

Thanks to our experience in creating comprehensive test tools, we have developed firmware on existing hardware and delivered a fully ready solution. **We have also used our CATF product to accelerate the MCTT development process significantly.**

MCTT has been composed of three parts:

- Software (built on top of Comarch Automated Test Framework, our own product)
- Hardware with dedicated firmware to fulfill FiRa UWB requirements
- Python test scripts (implemented for the purpose of the certification program)

This is a plug and play solution. MCTT works on a traditional PC with a USB connection to a Comarch ranging device. Communication is done over UWB.

For the purposes of development and preparation of ATL for certification, we also deliver sample devices.

See Comarch's product demo of MAC Conformance Test Tool for FiRa Consortium
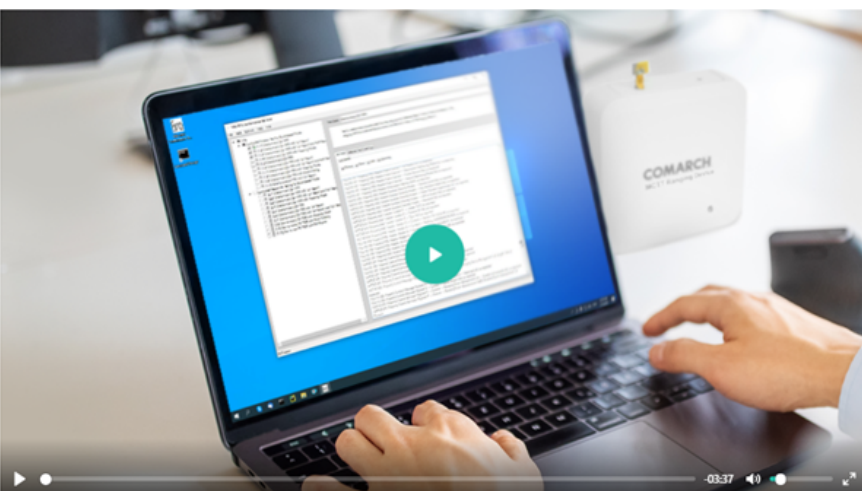
MAC Conformance Test Tool – is a new product in Comarch's offer for the certification of device compliance with the FiRa UWB standard.

Automated Test System for AirFuel Alliance wireless charging standard

Comarch has built a pioneering Automated Test System that supports the device certification process, standardization of wireless power and the construction of a global, interoperable ecosystem based on AirFuel Resonant™ technology.
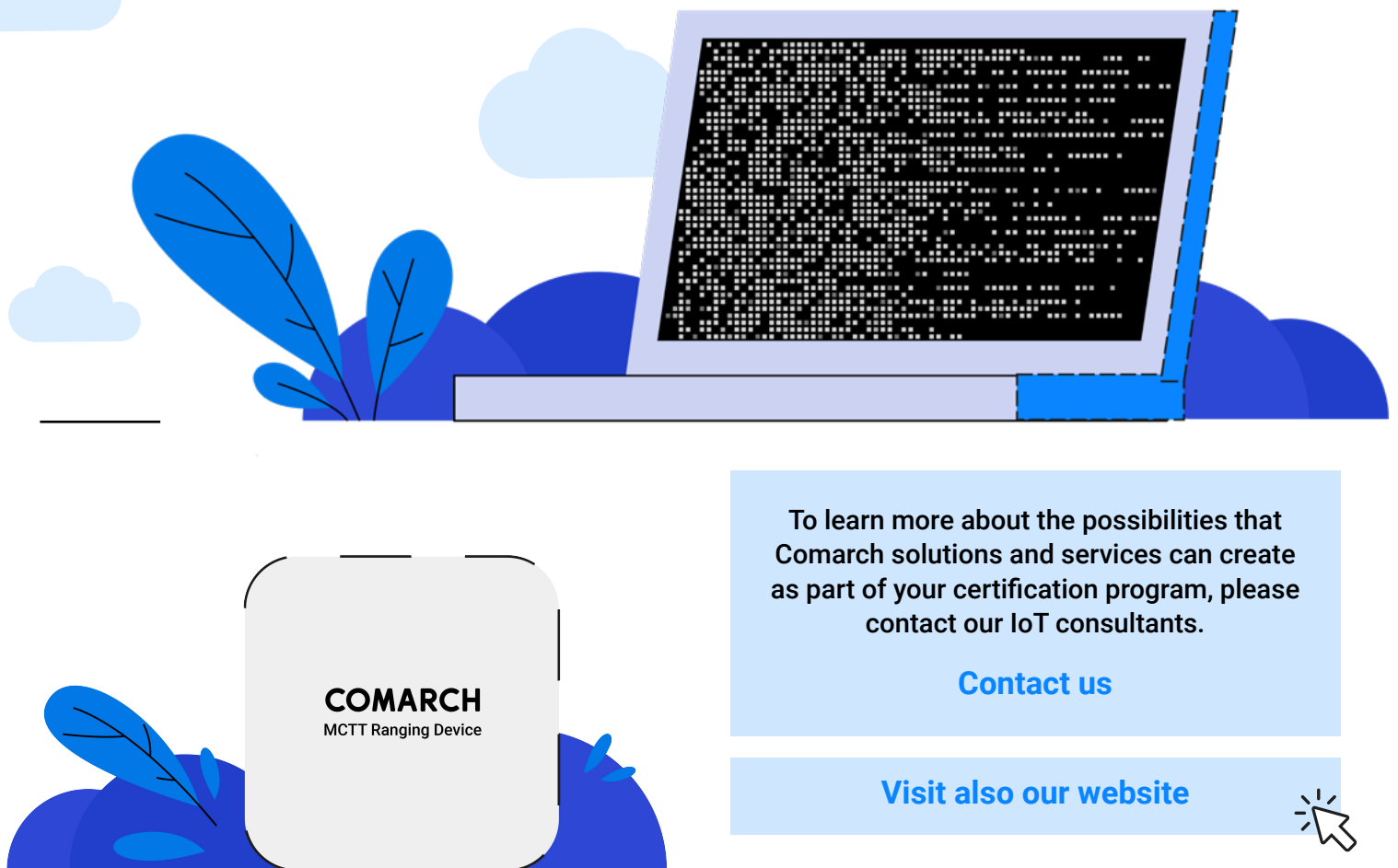
Comarch has developed a testing system for certification of wireless charging products, including chargers and devices. Test labs and device manufacturers may use the hardware and software solutions of ATS to verify compliance with the AirFuel Alliance's Magnetic Resonant™ standard for wireless power transfer. The tests performed by the ATS system are essential for AirFuel Resonant™ Certification, confirming global interoperability and thereby ensuring that consumers enjoy a consistent wireless charging experience across all certified AirFuel branded products.

Automated Test System (ATS) is an innovative and comprehensive **combination of software and hardware elements**, which was possible thanks to Comarch's wide experience in production of computer hardware (for example, creating system simulators and supporting tools from scratch, and software development (such as development of a test engine, synchronization algorithms and automation of CTS, RAT and IOP test cases).
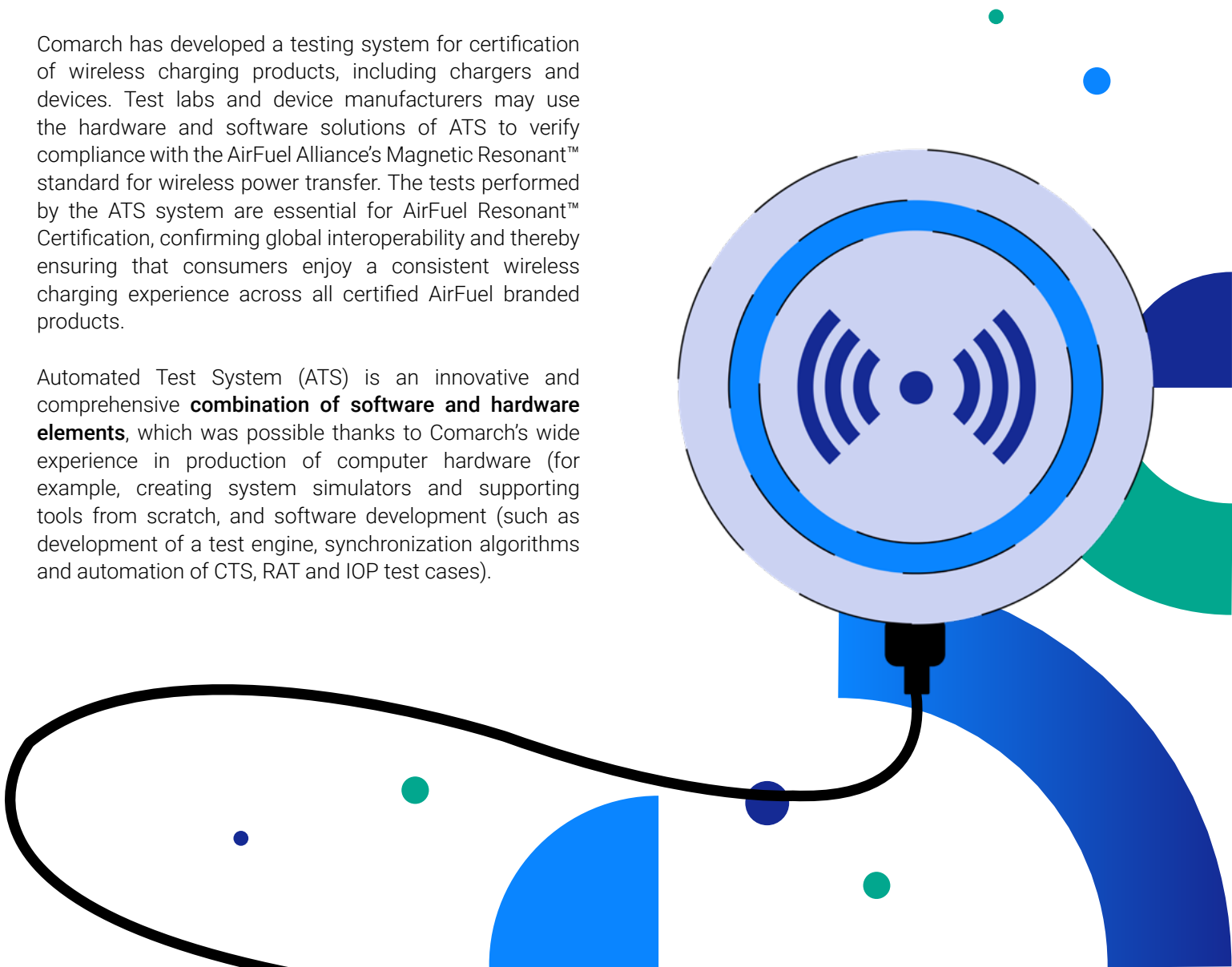
Summary

A pre-made, flexible Comarch Automated Test Framework can be an answer to the majority of challenges connected to the certification process such as lack of test tool, hardcoded tests, various format results, long implementation time and more. This solution not only enables significant shortening of the time to market but, thanks to its modular architecture, it also facilitates the adaption of the test tool and lowers the costs development and maintenance. In addition to offering a product that increases the efficiency of the certification process for standardization organizations (and ATLs conducting the testing phase), Comarch also acts as a flexible partner for the alliances thanks to its assistance and knowledge – from acquiring test tools from other entities to developing new ones and providing its own products in accordance with the client's requirements.

COMARCH
MCTT Ranging Device

To learn more about the possibilities that Comarch solutions and services can create as part of your certification program, please contact our IoT consultants.

Contact us

Visit also our website

About us

Comarch (headquartered in Kraków) is a leading global IT company with a portfolio of thousands of complex and successful IT projects and implementations of software development for more than 40,000 companies worldwide. We have wide knowledge of IT systems and solutions including cloud services, IoT ecosystems and embedded software.

Comarch has been a reliable partner for global IT standards organizations since 2007, when we has created a new version of the UPnP certification tool. Over the years, we've worked with various organizations and gained knowledge and expertise in how to support certification bodies at each step of the creation of certification programs, and aid their members in technology adoption.

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