

Deep Dive into OpenADR 3.0



Michał Juszcak
Head of Engineering
michal.juszcak@codibly.com



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Benefits of Open ADR evolution for developers

- **Enhanced functionality:** New features and improved mechanisms for better demand-side energy management.
- **Simplified integration:** Easier to implement due to a more organized and modernized protocol structure.
- **Improved maintenance:** Streamlined updates and long-term support post-deployment.



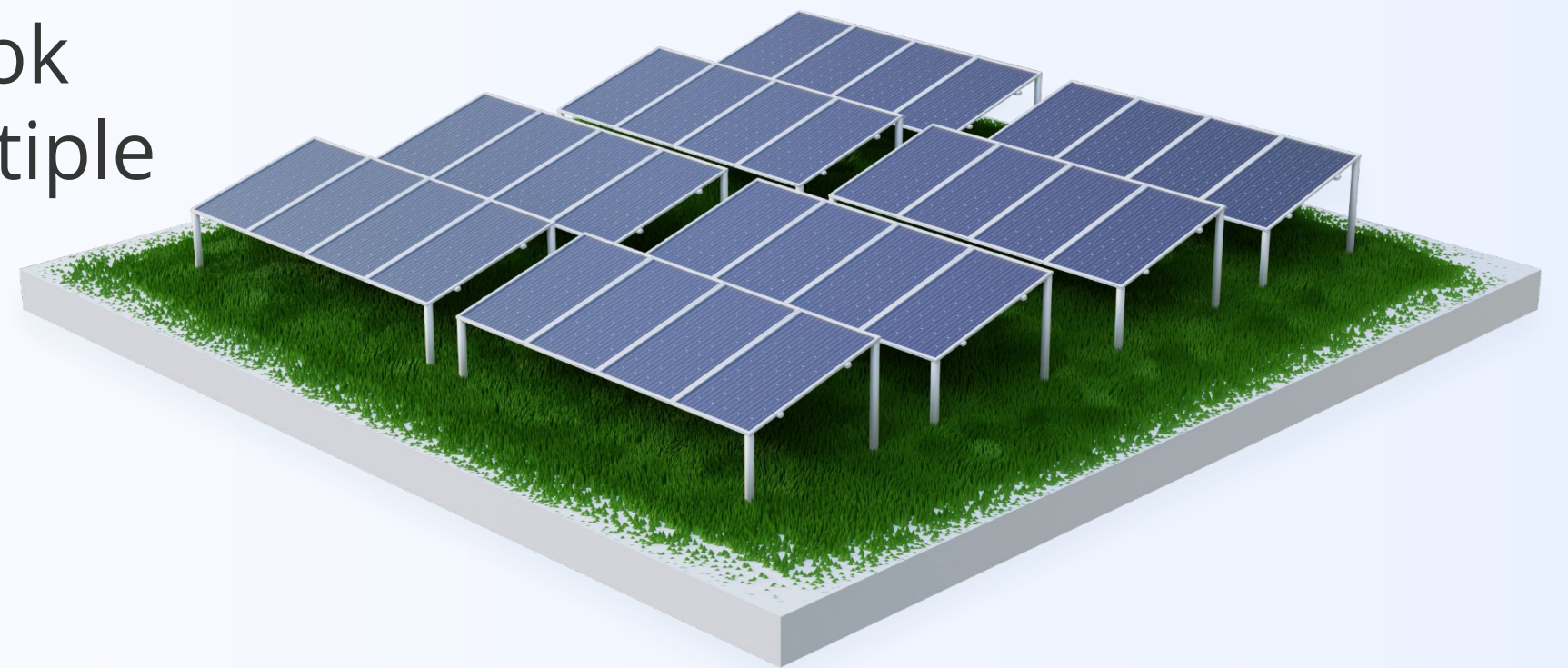
Convention over Specification: HTTP, JSON, OAuth, and RESTful architecture

- Lower entry threshold
- Reusability
- Easier maintenance
- Simplified problem diagnosis



Key feature changes in OpenADR 3.0

- **Programs management:** OpenADR 3.0 introduces a “program” construct, describing metadata of a DR offering
- **VEN and resource:** Enrollment is still out of band, but VTNs have an API dedicated to VENs and associated resources
- **Push via subscription:** Bi-directional data exchange is still possible via webhook
- **Event priorities:** VTN can offer multiple programs at the same time



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Objects in OpenADR 3.0

- **Structured object management:** Consistent methodology for managing different energy system components
- Object types with unique identifiers:
 - **Program**
 - **Event**
 - **Report**
 - **Subscription**
 - **VEN**
 - **Resource**

Where detailed object attributes can be found?
In **OpenADR 3.0.1 Definitions** documentation.



Creating addressable objects event example

- Two-Step Creation Process
 - Step 1.** Client retrieves the objectID of an associated program using a GET request
 - Step 2.** The client uses this objectID in a POST request to create and link a new event to the program
- Object References
 - Objects are connected by unique **objectIDs**
 - Each event includes a **programID** to ensure it's linked to the correct program



Object management

- **Standard CRUD like API methods**

Use GET (retrieve), PUT (update), and DELETE (remove) to manage objects efficiently.

- **Unique naming requirements**

Certain object names must be unique within their scope to prevent conflicts:

- **program.programName**
- **ven.venName**
- **ven.resource.resourceName**

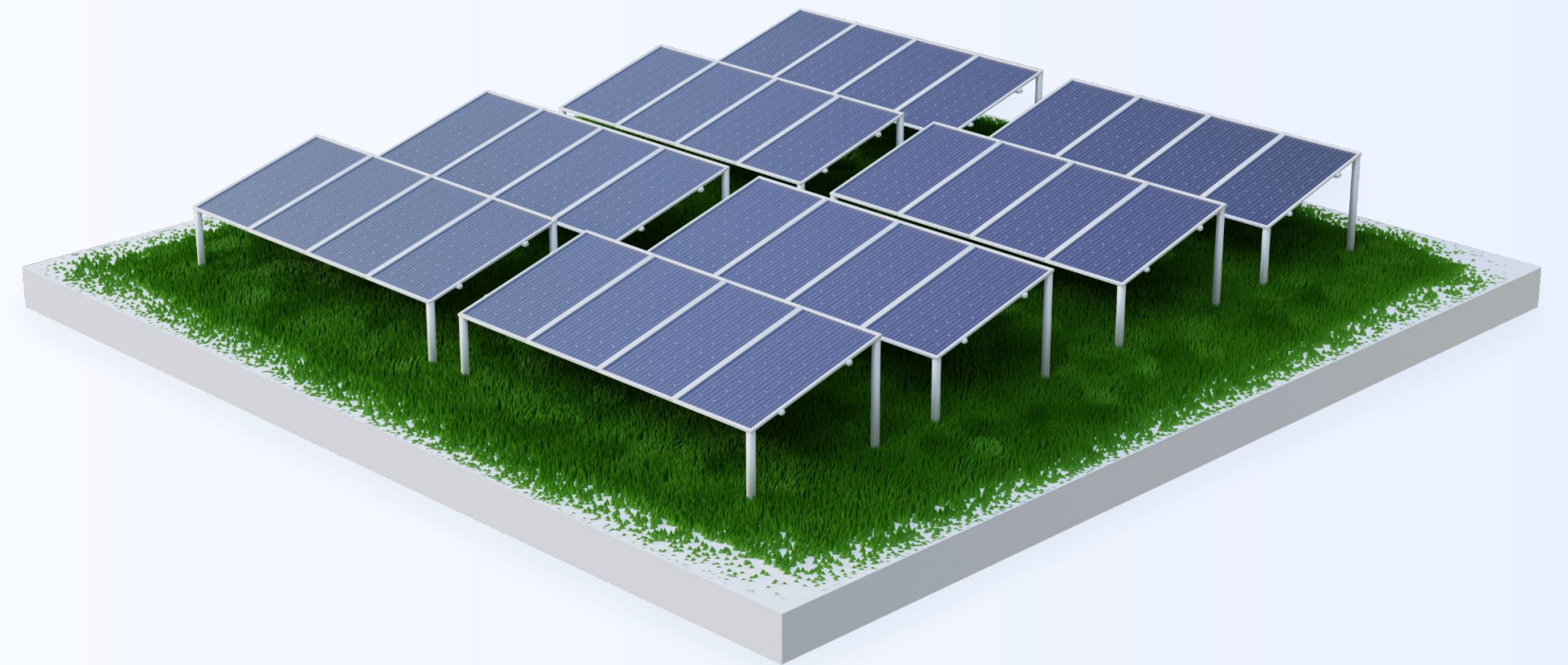


What happened to Opt?

Events can define reporting requirements

VTN can define a program (or an event), that requires reporting of the predicted load shed capacity prior to the event start time

This approach simplifies the basic use case, while still allowing the same functionality



Attributes of OpenADR 3.0 objects

- **Unique IDs**
 - Each object (*Program*, *Event*, *Report*) has a unique identifier (*programID*, *eventID*, *reportID*) for easy identification and retrieval
- **Linked relationships**
 - IDs link objects, such as *programID* connecting *Events* to *Programs*, ensuring organized and consistent data
- **Human readable names and descriptions**
 - Object names (e.g., *programName*) help with quick identification and clarity of roles
- **Activity duration**
 - Events include intervals for *start* and optional *end times*, supporting tracking and scheduling

GET program

```
{
  "bindingEvents": false,
  "createdDateTime": "2023-06-15T12:58:08.000Z",
  "id": "44",
  "localPrice": false,
  "objectType": "PROGRAM",
  "programName": "minimalProgram"
}
```

GET event

```
{
  "createdDateTime": "13:21:51",
  "eventName": "minimalEvent",
  "id": "1",
  "intervalPeriod": {
    "start": "0000-00-00"
  },
  "intervals": [
    {
      "id": 0,
      "payloads": [
        {
          "type": "PRICE",
          "values": [
            0.17
          ]
        }
      ]
    }
  ]
},
  "objectType": "EVENT",
  "programID": "44"
}
```

OpenADR 3.0 extensibility features

- **Model extensions**
 - Allows adding custom constructs to standard models to meet specific needs.
 - Unrecognized extensions are ignored by VTNs, maintaining standard operations.
- **Private strings**
 - Custom values can be added to object fields when agreed upon by VTNs and clients.
 - Enhances flexibility without altering core protocol behaviors.

```
{  
  "ID": 1,  
  "createdDateTime": "2023-06-15T09:12:28.000Z",  
  "modificationDateTime": "0000-00-00",  
  "myPrivateObject": "whatever I want",  
  ....  
}
```

```
"payloads": [  
  {  
    "type": "PRIVATE_ALGORITHM",  
    "values": [0.17]  
  },  
]
```

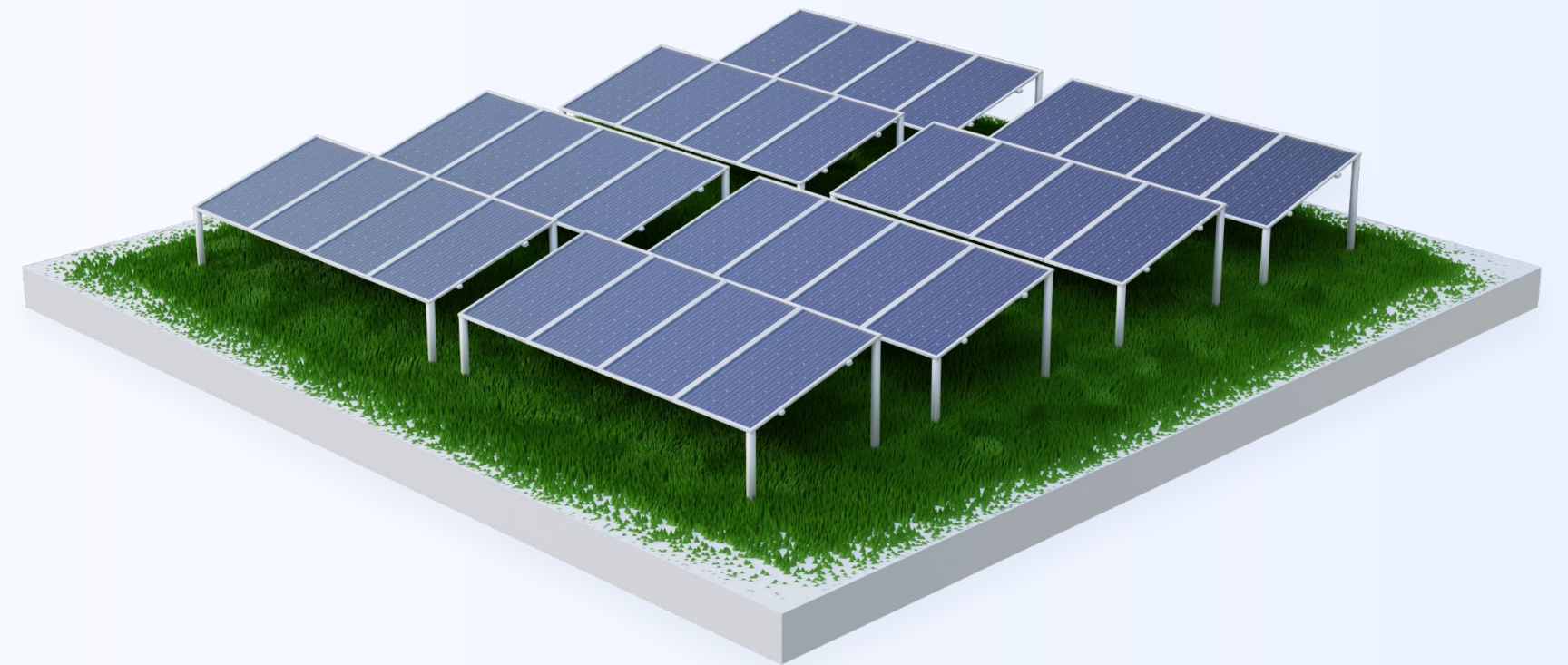
Changes in security

mTLS no longer needed

Only the server (VTN) is required to provide a certificate. TLS requirements are also simplified

OAuth 2.0 credential flow

VEN is provided with credentials out-of-band. JWT bearer token is suggested



OpenADR 3.0 documentation overview

- **OpenADR 3.0 / OpenADR 3.0.1 User Guide**
 - Illustrative usage scenarios and examples
 - Helps in understanding API for energy demand management
 - Provides use cases for programs, events, reports, and endpoints
- **OpenADR 3.0 / OpenADR 3.0.1 Definitions**
 - Explains key terms and protocol changes
 - Both normative and non-normative content to aid implementation
- **OpenADR 3 API in YAML**
 - Describes API structure in YAML format
 - Supports operations like managing programs, events, reports, and subscriptions
 - Facilitates automation, testing, and integration



OpenADR 3.0 Testing & Certification Tool

- **OADR Test Tool overview:** Supports certification and testing for VTNs and VENs. OpenADR Alliance members can use the tool for solution verification.
- **Testing & certification process:** User registers via OpenADR web app. Tester (tests via TT) vs Certifier (conducts full certification).
- **System Architecture:** Test Tool assumes the role of a VTN or VEN, runs requested scenarios and provides full data audit trail for external verification.

[Go Back to VTN Test Runs](#)

6ea56097-4e45-4ad3-adf1-84b49c637057_report.html
 Report generated on 23-Oct-2024 at 17:05:12 by [pytest-himi](#) v4.0.2

Environment

Python	3.9.20
Packages	<ul style="list-style-type: none"> pytest: 7.4.2 pluggy: 1.5.0
Plugins	<ul style="list-style-type: none"> himi: 4.0.2 metadata: 3.0.0

Summary
 206 tests took 00:01:47.

(Un)check the boxes to filter the results.

0 Failed, 206 Passed, 0 Skipped, 0 Expected failures, 0 Unexpected passes, 0 Errors, 0 Retuns

Result	Test	Description	Duration
Passed	VTN_test/event_test/test_events.py::test_create_event_bl	Test case for create_event: bl_token assert: HTTPStatus.CREATED	222 ms
Passed	VTN_test/event_test/test_events.py::test_create_event_bl_wrong_program	Test case for create_event: bl_token assert: HTTPStatus.BAD_REQUEST	175 ms
Passed	VTN_test/event_test/test_events.py::test_create_event_bl_no_program	Test case for create_event: bl_token assert: HTTPStatus.BAD_REQUEST	51 ms
Passed	VTN_test/event_test/test_events.py::test_create_event_ven	Test case for create_event: ven_token assert: HTTPStatus.FORBIDDEN	155 ms
Passed	VTN_test/event_test/test_events.py::test_delete_event_bl	Test case for delete_event: bl_token assert: HTTPStatus.OK	296 ms

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VEN Test Runs

[Create VEN Test Run](#) [Test VEN Credentials](#)

Timestamp	Status	Profile	VTN url	Results	Actions
Nov. 8, 2024, 6:46 p.m.	READY_TO_USE	baseline	https://2xp7h73icstbrwixalre3myzeu0irash.lambda-url.us-east-1.on.aws/openadr3/3.0.1/		Execute Delete
Oct. 25, 2024, 6:02 p.m.	SUCCESSFUL	baseline	https://mrjlvbmgw5tyluac2m2foo3uky0jwegw.lambda-url.us-east-1.on.aws/openadr3/3.0.1/	Show results	Delete

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VTN Certifications

Status	VTN url	Product ID	Manufacturer ID	Created	Last test run	User ID	Results	Actions
WAITING_FOR_APPROVAL	https://2xp7h73icstbrwixalre3myzeu0irash.lambda-url.us-east-1.on.aws/openadr3/3.0.1/	1	1	Oct. 23, 2024, 4:57 p.m.	Oct. 23, 2024, 4:59 p.m.	2014451860	Show results	Approve
CERTIFIED	https://mrjlvbmgw5tyluac2m2foo3uky0jwegw.lambda-url.us-east-1.on.aws/openadr/v1	1	2	Oct. 24, 2024, 1:34 p.m.	Oct. 24, 2024, 1:42 p.m.	2014641874	Show results	
CERTIFIED	https://mrjlvbmgw5tyluac2m2foo3uky0jwegw.lambda-url.us-east-1.on.aws/openadr/0.1	1	3	Nov. 4, 2024, 5:19 p.m.	Nov. 4, 2024, 5:20 p.m.	2016282458	Show results	

OpenADR 3.0 Summary

- **Intuitive approach**
Easier integration and long-term maintenance
- **Simplified and streamlined**
Implementation of a simple VTN offering a dynamic pricing program is very straightforward
- **Comprehensive tools**
Supports interoperability with documentation and testing tools
- **Things still need to happen out-of-band**
Program definitions and enrollments need to be communicated outside of OpenADR



Thank you!

