VBaaS: VNF Benchmark-as-a-Service
(draft-rorosz-nfvrg-vbaas-00.txt)

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Outline

Outline

VNF Benchmarking

Actors as in the Figure

```
                                  +---------+
                                  |Customers|
      ,----.          +---------+ +-+-------+
     ( VNF1 )         |  VNF    |   |  SAP1 +----+   +----+
      `----'   | Developers|   |   0---|VNF1|---|VNF2|---0
      ,----.   |Developers|   |        +----+   +----+ SAP2
     ( VNF2 )+-------+-+    |        <=======VNF-FG======>
      `----'          |        |
                   +-+-------+---+
                   | NFVO / VNFM |
                   | (Service    |
                   |   Provider) |
                   +-+----+----+-+
                    /     |     \
                   V      V      V
              +------+ +------+ +------+
              | VIM1 | | VIM2 | | VIM3 |
              +-+----+ +--+---+ +----+-+
                |         |         |
                |         |         |
                |         |         |
SAP1 +-----+-+ WAN +---+---+ WAN +-+-----+  SAP2
   0-| PoP 1 |-----| PoP 2 |-----| PoP 3 |-0
     +-------+     +-------+     +-------+
       PoP1          PoP2          PoP3
       Container     Enhanced      Baremetal
       OS            Hypervisor
```
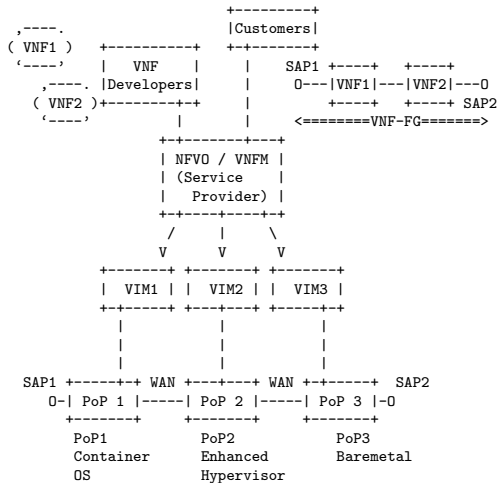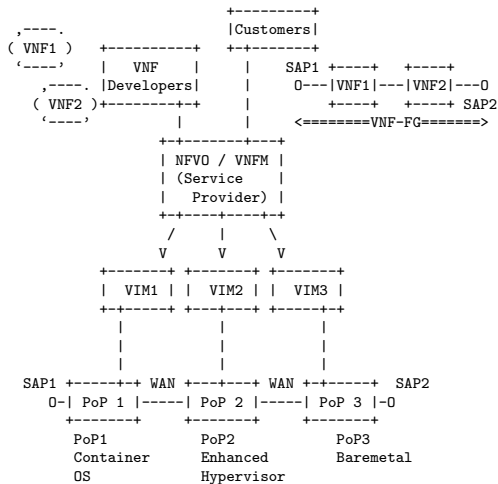
VNF Benchmarking

Actors as in the Figure

Problem to be solved:

- Gain information *autonomously* about VNFs' benchmark metrics with given reserved resources at given VIM (NFVI PoP).
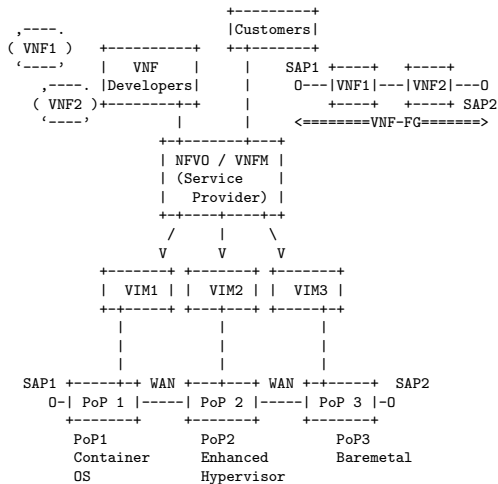
VNF Benchmarking

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Problem to be solved:

- Gain information *autonomously* about VNFs' benchmark metrics with given reserved resources at given VIM (NFVI PoP).

An important usage:

- Orchestration (e.g., NFVO) needs to know throughput, latency (and jitter) performance values for a given resource allocation (cpu, memory, storage) of a VNF at a VIM.
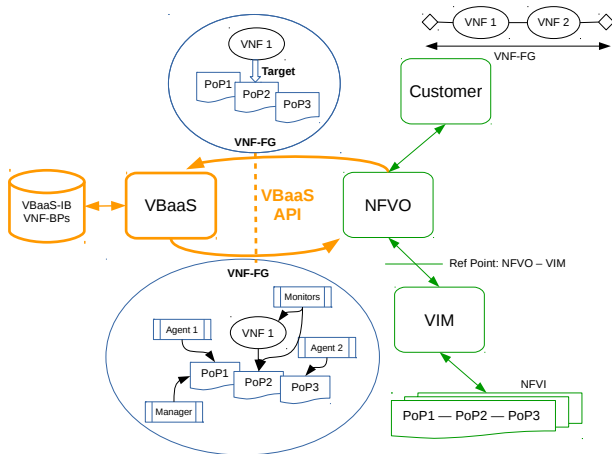
```
                            +---------+
  ,----.                    |Customers|
 ( VNF1 )  +----------+     +-+-------+
  `----'   |   VNF    |       |  SAP1 +----+  +----+
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   `----'          |          |       <=======VNF-FG======>
                   |        +-+-------+---+
                   |        | NFVO / VNFM |
                   |        | (Service    |
                   |        |   Provider) |
                   |        +-+----+----+-+
                   |         /     |     \
                   |        V      V      V
                +-------+ +-------+ +-------+
                | VIM1  | | VIM2  | | VIM3  |
                +-+-----+ +--+----+ +-----+-+
                  |          |           |
                  |          |           |
                  |          |           |
 SAP1 +-----+ WAN +---+--+ WAN +-+-----+ SAP2
   O-| PoP 1 |-----| PoP 2 |-----| PoP 3 |-O
     +-------+     +-------+     +-------+
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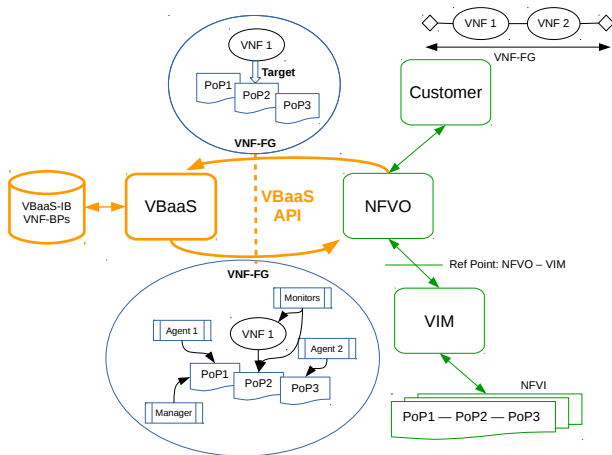
Outline

How? VNF Benchmarking as a Service (VBaaS)

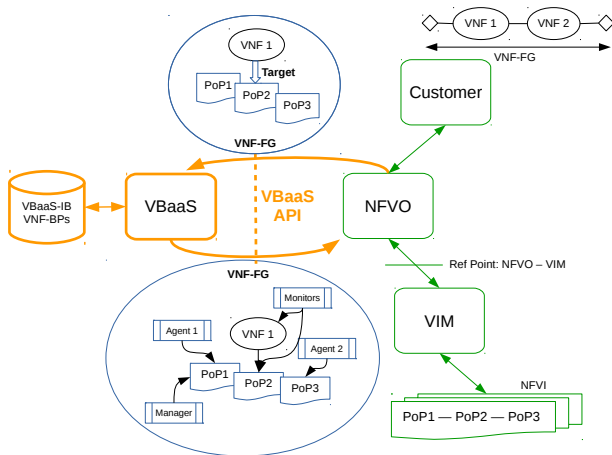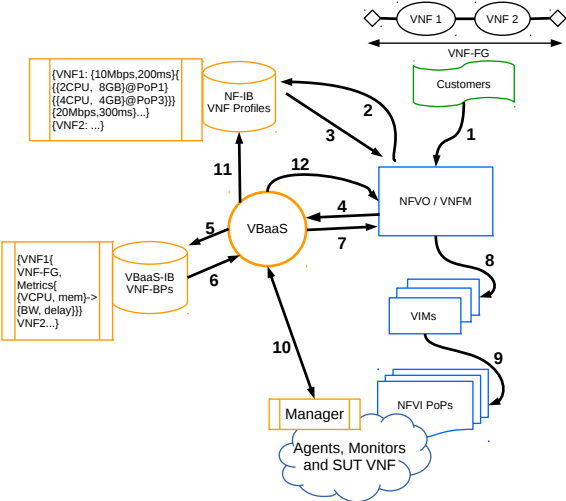# How? VNF Benchmarking as a Service (VBaaS)

VBaaS objectives

- "Black box" VNF benchmarking, with respect to the
  - NVFO
  - Benchmarking Service

How? VNF Benchmarking as a Service (VBaaS)

VBaaS objectives

- "Black box" VNF benchmarking, with respect to the
  - NVFO
  - Benchmarking Service
- VBaaS uses NFVO (or VIMs) to deploy benchmark measurements
  - e.g., by VNF-FG

VBaaS Process Walk-through

Usage: Benchmarking, Dimensioning and Verification

Benchmarking
To measure VNF's throughput, latency, jitter parameters for given cpu, memory, storage reservation at given VIM.

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Benchmarking
To measure VNF's throughput, latency, jitter parameters for given cpu, memory, storage reservation at given VIM.

Dimensioning
To determine cpu, memory, storage reservation parameters for given VNF at given VIM for target throughput, latency, jitter parameters.

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To determine cpu, memory, storage reservation parameters for given VNF at given VIM for target throughput, latency, jitter parameters.

Verification
To assess if given throughput, latency, jitter parameters of a VNF is met with given cpu, memory, storage reservation at given VIM.

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Observation
Dimensioning and verification boil down to benchmarking operation(s).

Outline

Recursive Orchestration with VBaaS

UNIFYing carrier network and cloud resources

- Recurrent joint software and networking control API[a]
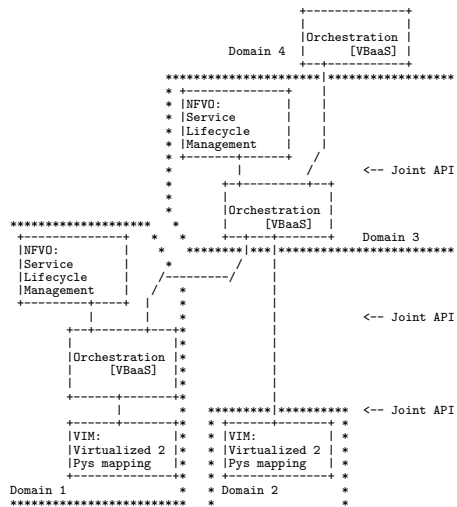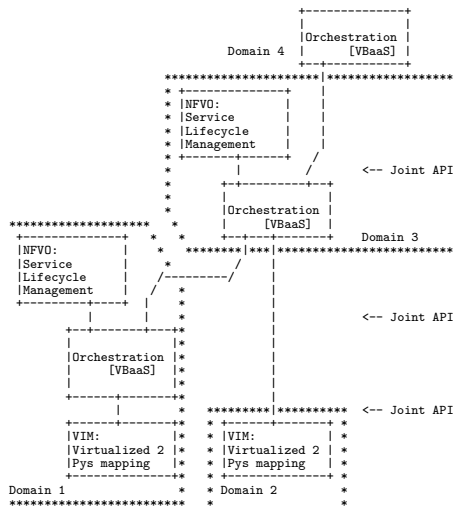
[a]draft-unify-nfvrg-recursive-programming-02

Recursive Orchestration with VBaaS

UNIFYing carrier network and cloud resources

- ▶ Recurrent joint software and networking control API[a]
- ▶ Flexibility in resource virtualization with Big Switch with Big Software (similar to SDN Controller's Virtualized Data Plane concept)

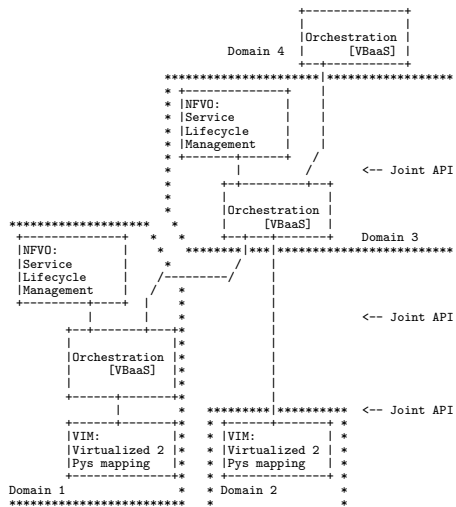[a]draft-unify-nfvrg-recursive-programming-02

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is part of each orchestration component; options:

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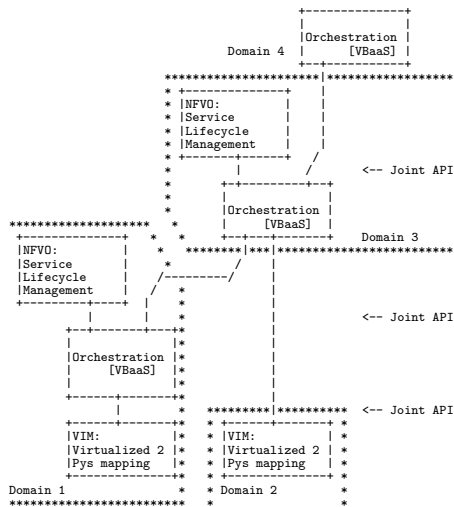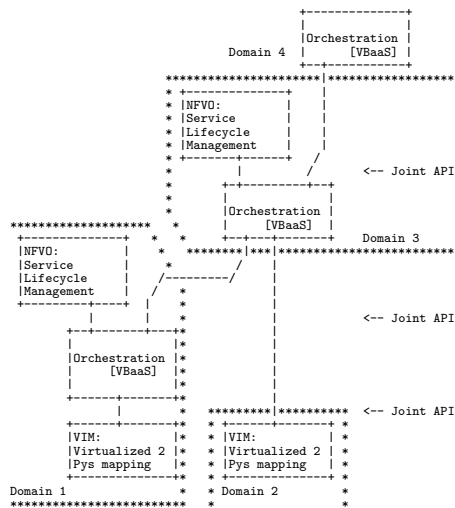
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```
                                        +--------------+
                                        |Orchestration |
                          Domain 4      |   [VBaaS]    |
                                        +--+-------+---+
                    *********************|**************************
                    *  +--------------+  |
                    *  |NFVO:         |  |
                    *  |Service       |  |
                    *  |Lifecycle     |  |
                    *  |Management    |  |
                    *  +------+-------+  |
                    *         |       /     <-- Joint API
                    *         |      /  |
                    *      +--+-----+---+--+
                    *      |Orchestration |
                    *      |   [VBaaS]    |
********************* *    +--+-------+---+   Domain 3
+--------------+    * *       |       |
|NFVO:         |    * ********|***|***********************
|Service       |    *       /    |  |
|Lifecycle     |    *      /     |  |
|Management    | /--------/      |  |
+------+-------+ |  *            |  |
       |        |  *            |  |           <-- Joint API
       |        |  *            |  |
    +--+--------+--+  *         |* |
    |Orchestration |  *         |* |
    |   [VBaaS]    |  *         |* |
    |              |  *         |* |
    +------+-------+  *         |* |
           |         *  ********|**********  <-- Joint API
    +------+-----+*  * +--------+-------+ *
    |VIM:        |*  * |VIM:            | *
    |Virtualized 2|* * |Virtualized 2  | *
    |Pys mapping |*  * |Pys mapping    | *
    +------------+*  * +---------------+ *
Domain 1         *  * Domain 2         *
*****************   *                   *
```

Recursive Orchestration with VBaaS

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is part of each orchestration component; options:

- ▶ request VNF profiling from the virtualization provider;
- ▶ do it on your own "transparently" over the underlying substrates.

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VBaaS Request and Reporting as Capabilities

Capability reporting

▶ Based on a virtualization yang model each execution environment can report VNF benchmarking results.

```
+--------------+   VBaaS    +--------------+
|Orchestration |   API-1    |Orchestration |
| (NFVO        |<---------->| (NFVO        |
|  Consumer)   |            |  Producer)   |
+------+-------+            +------+-------+
       |  1)get-config()          |
       |------------------------>>|
       |    2)rpc-reply(virt)     |
       |<<------------------------+
       |                          |
       |  3)edit-config(NF1@cap)  |
       +------------------------>>|
       |     4) rpc-ok            |
       |<<------------------------+--+
       |                          |  |
       |                          |  | VBaaS
       |    5)<notification>      |  |
       |<<------------------------+<-+
       |  6)get-config(NF1@cap)   |
       |------------------------>>|
       |  7)rpc-reply(NF1@cap)    |
       |<<------------------------+
```

VBaaS Request and Reporting as Capabilities

Capability reporting

- Based on a virtualization yang model each execution environment can report VNF benchmarking results.
- Consumer can request a capability report by defining partial capability entries
    - Providing only performance KPI means a dimensioning request
    - Providing only resource allocation means a benchmarking request
    - Providing both mean verification

```
+-------------+    VBaaS   +-------------+
|Orchestration|   API-1    |Orchestration|
| (NFVO       |<---------->| (NFVO       |
|  Consumer)  |            |  Producer)  |
+-----+-------+            +-----+-------+
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      |    2)rpc-reply(virt)     |
      |<<------------------------+
      |                          |
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      +------------------------->>|
      |      4) rpc-ok           |
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      |                          |  |
      |                          |  | VBaaS
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      |<<------------------------+<-+
      |  6)get-config(NF1@cap)   |
      |------------------------->>|
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      |<<------------------------+
```

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Summary

Autonomous VNF Benchmarking service seems inevitable to support agile VNF development of 3rd parties.

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- ▶ defining complementary functional components to ETSI NFV and other approaches;
- ▶ defining interfaces to the VBaaS service;

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Summary

Autonomous VNF Benchmarking service seems inevitable to support agile VNF development of 3rd parties.

VNF Benchmarking as a Service (VBaaS) aims at

- defining complementary functional components to ETSI NFV and other approaches;
- defining interfaces to the VBaaS service;
- defining possible VBaaS work-flows.

Acknowledgements