

# Orange v2 Implementation Aspects

SC-214/WG-92 meeting  
Paris, July 18-22, 2022

SITA  
2022-Jul-11, version 2

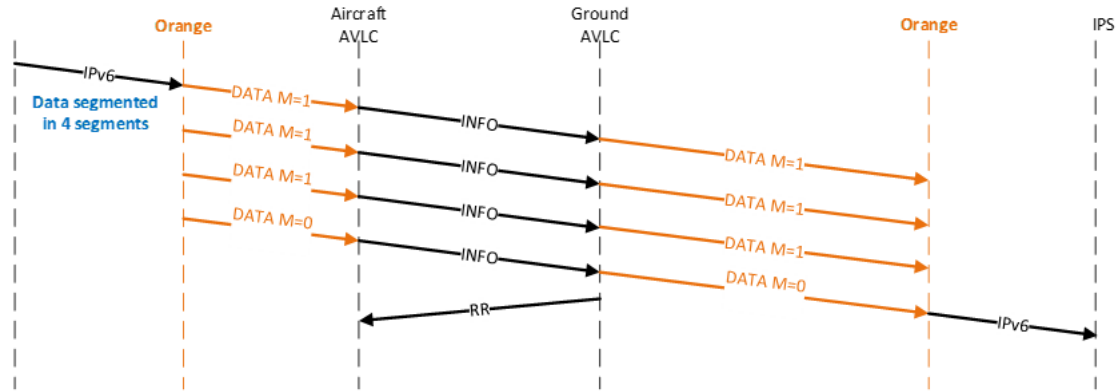


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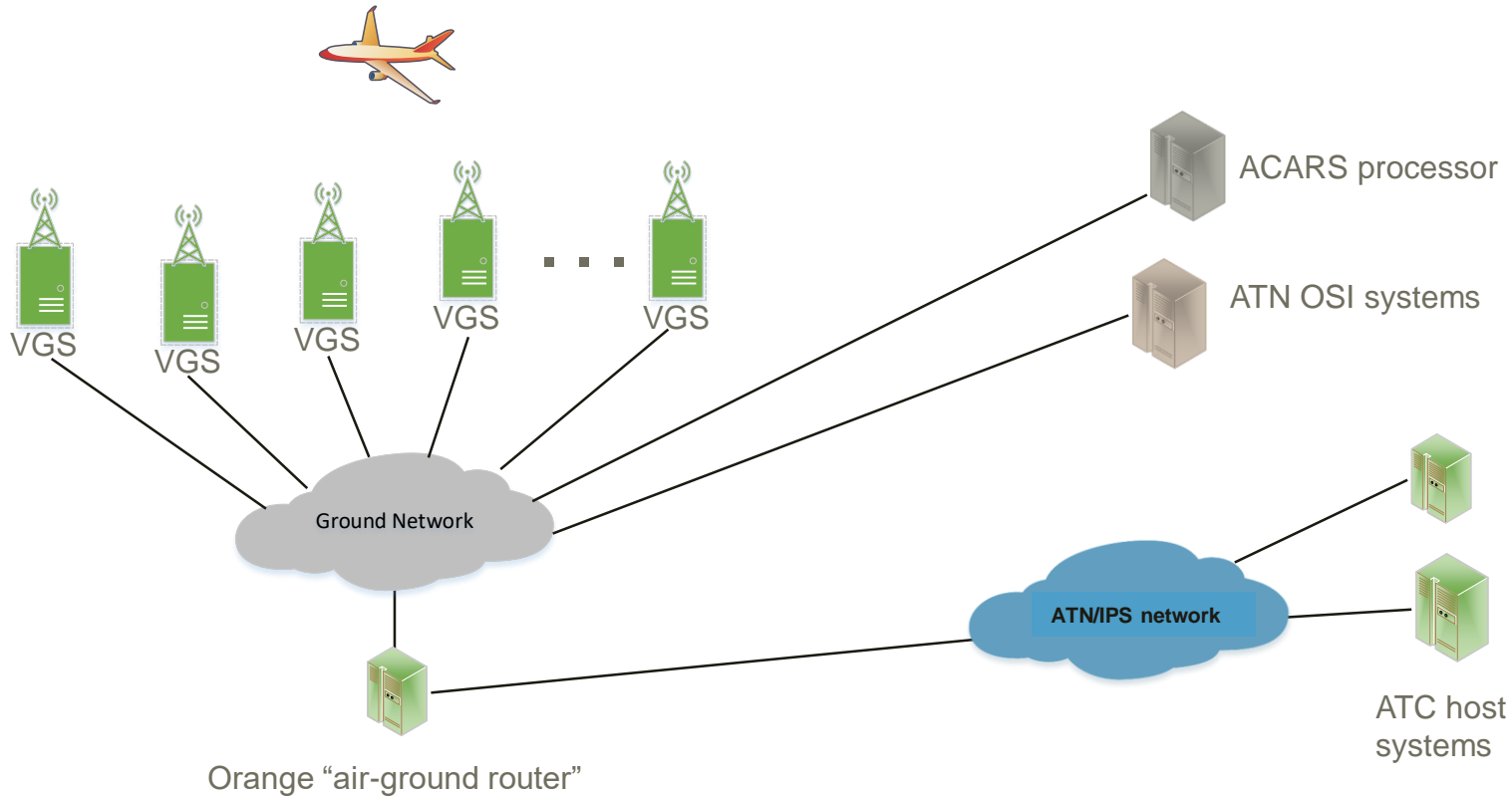
1. Reference: network topology
2. Segmentation
3. MIC
4. Segment size management
5. Conclusions/Recommendations

# 1. Reference: network topology

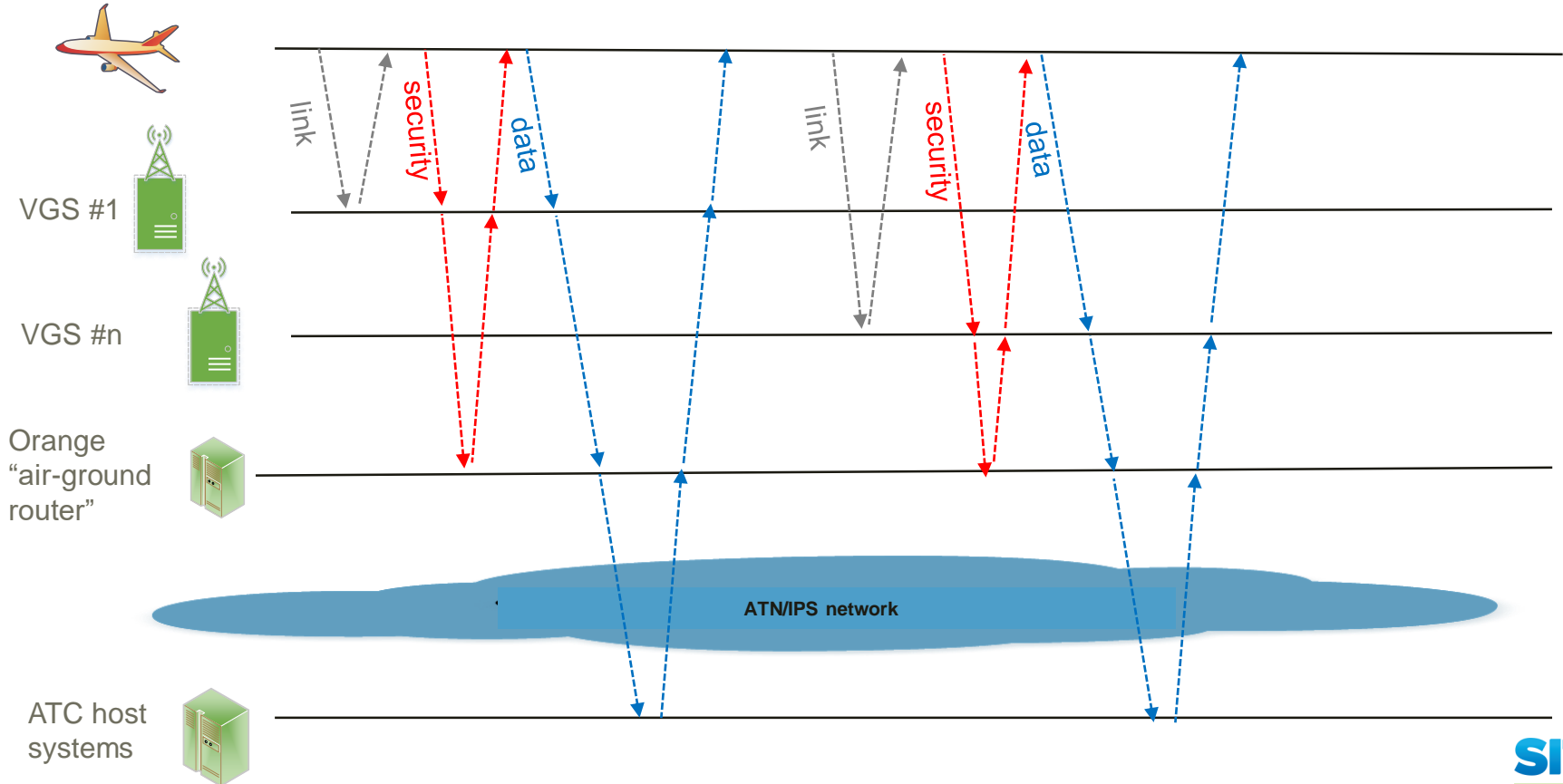


1. Where are the different functions implemented?
  - Ground AVLC in VGC, Orange in external system, or
  - Ground AVLC and Orange in VGC

# 1. Reference: network topology



# 1. Reference: network topology



## 2. Segmentation

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1. Segmentation at Orange “air-ground router” or at the VGS
2. Segmentation at VGS:
  - Easier to implement since the VGS manages AVLC traffic with the aircraft
  - VGS must manage the MIC, which requires security initiation with every AVLC link
3. Segmentation at the Orange router:
  - Security only initiated once, maintained over successive links
  - Duplicates the AVLC layer function
  - Requires special signaling between the router and the VGS to preserve segment ordering and convey N1 implemented at the VGS and uplink segment delivery status

### **REQ-ORI-FR-018**

In case the AVLC link is disconnected during a multi segment transmission, the sending Orange over INFO **shall** consider that all the segments of the current multi segment transmission have to be retransmitted (as if they were not transmitted at all).

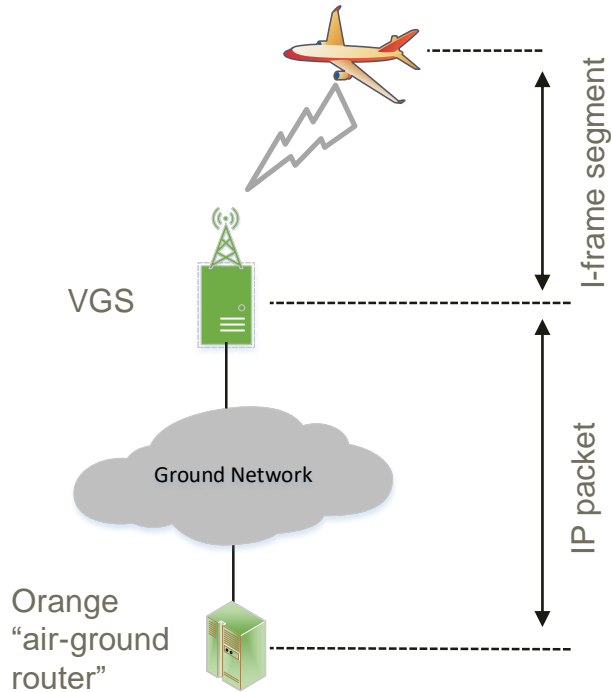
*Note: disconnected means that a VDL SERVICE UNAVAILABLE INDICATION has been sent to Orange over INFO.*

*Note: When a handoff occurs then Orange will continue transmitting message segments to the new ground station.*

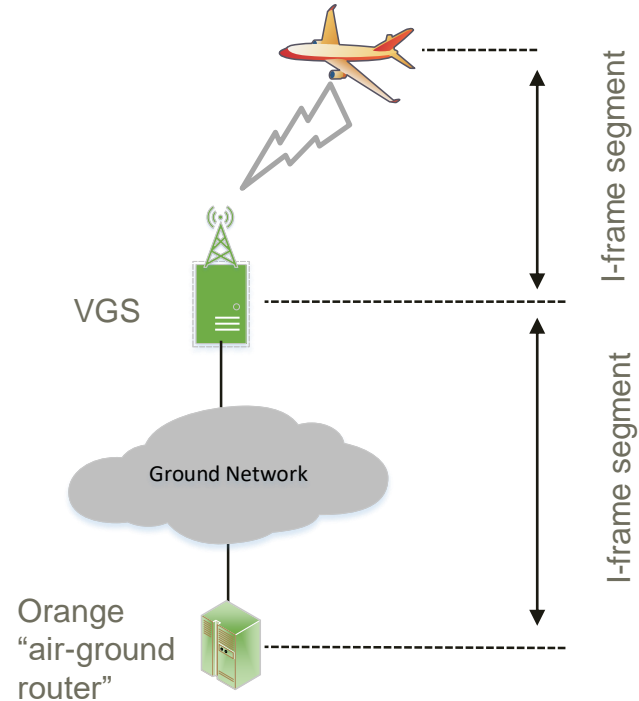
The VDL Mode 2 subnetwork utilizes the Orange protocol to provide segmentation of messages that exceed the AVLC frame size. The Orange protocol receives the IPv6 packet (maximum size of 1280 bytes) and segments it as needed to fit within the AVLC frame size (N1). Each of these segments is embedded in an AVLC frame with the IPS IPI, the Orange protocol header and the computed MIC at the end of the Orange payload.

## 2. Segmentation

Segmentation at the VGS



Segmentation at the Orange router



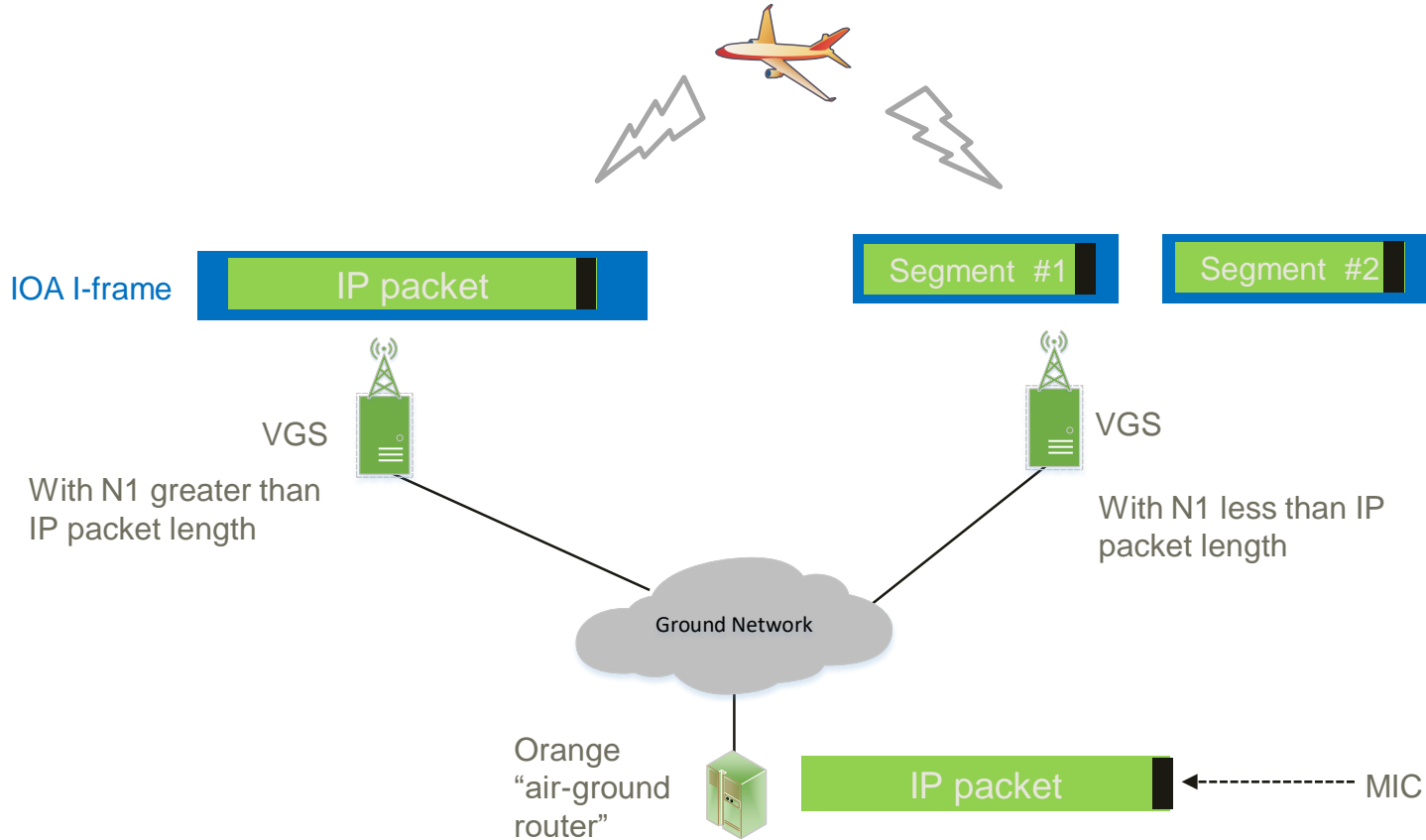
## 2. MIC

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1. MIC per IP packet or per segment
2. Question: if an IPS packet fits inside one AVLC I-frame segment then only 1 MIC is generated and it is considered to provide the required security but if the same IPS packet is split into two AVLC segments then each segment requires its own MIC?



## 2. MIC

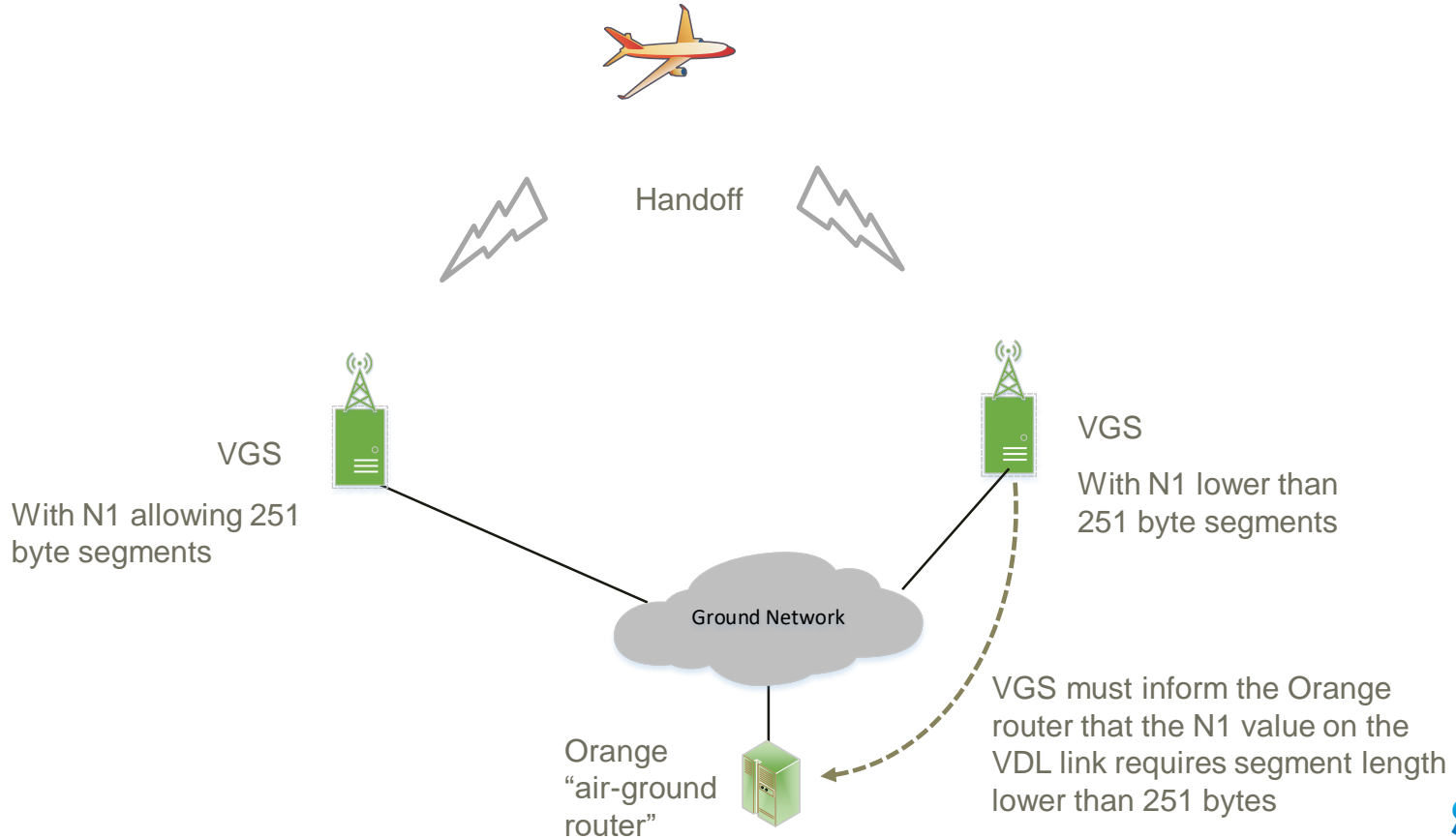


## 4. Segment size management

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1. Current Orange description proposes to manage fragment size by adjusting the N1 value
2. N1 value equivalent to I-frames with less than 251 bytes cannot be broadcast in GSIF because it impacts AOA traffic handling of other non-ATN/IPS aircraft accessing the same VGS
3. N1 value change can be signaled by VGS to specific aircraft in XID\_RSP\_LE/HO but that will then preclude those aircraft from sending AOA traffic
4. N1 value must be signaled to the Orange router, requiring the development of a proprietary protocol between the VGS and Orange router

# 4. Segment size management



## 5. Conclusions/Recommendations

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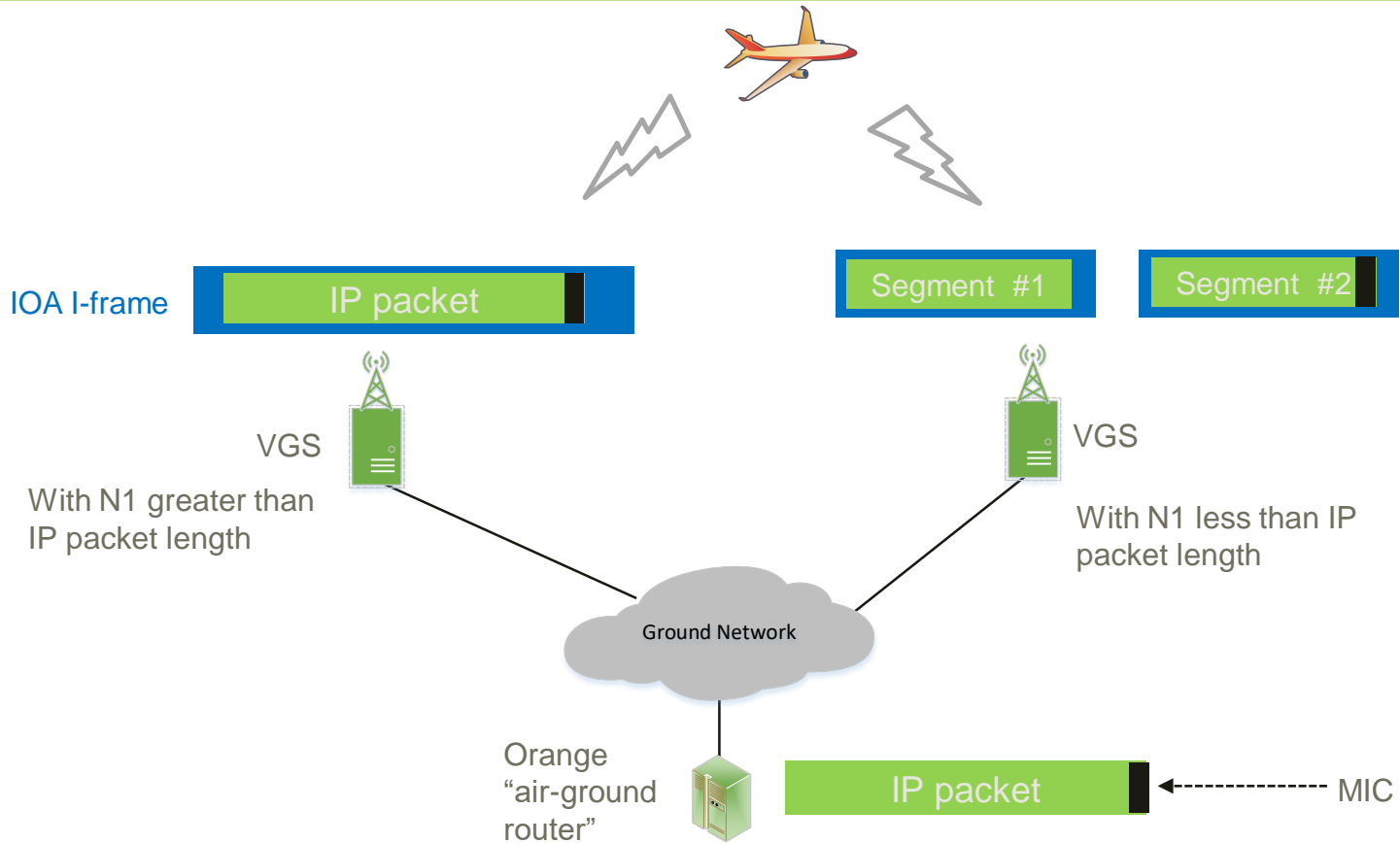
Implementation choice	Pros	Cons
Current Orange v2 spec: <ul style="list-style-type: none"><li>- segmentation at Orange</li><li>- security (MIC) at Orange</li><li>- MIC per segment</li></ul>		Requires complex signalling interface between the VGS and system implementing Orange
Alternative Orange implementation: <ul style="list-style-type: none"><li>- security (MIC) at Orange</li><li>- segmentation at VGS</li><li>- one MIC per IP packet</li></ul>	Simplified interface between VGS and Orange router Allows seamless transition between VGSs with different N1	

## 5. Conclusions/Recommendations

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1. Segmentation at the VGS
2. One MIC per IP Packet
3. Security (MIC) at Orange “air-ground router”

# 5. Conclusions/Recommendations



Thank You

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