

ITALIAN PASTA CAFE  
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## Permanent Roamer



# Permanent Roaming (PR) Definition

Subscriber (or Machine) actively uses SIM card of an operator from country A – exclusively, or almost exclusively – either in his/her country of residence, which is different from country A, or in a number of countries other than country A.

\*There may be different rules that govern legitimate usage based on regulation or mutual agreement in different geographies.

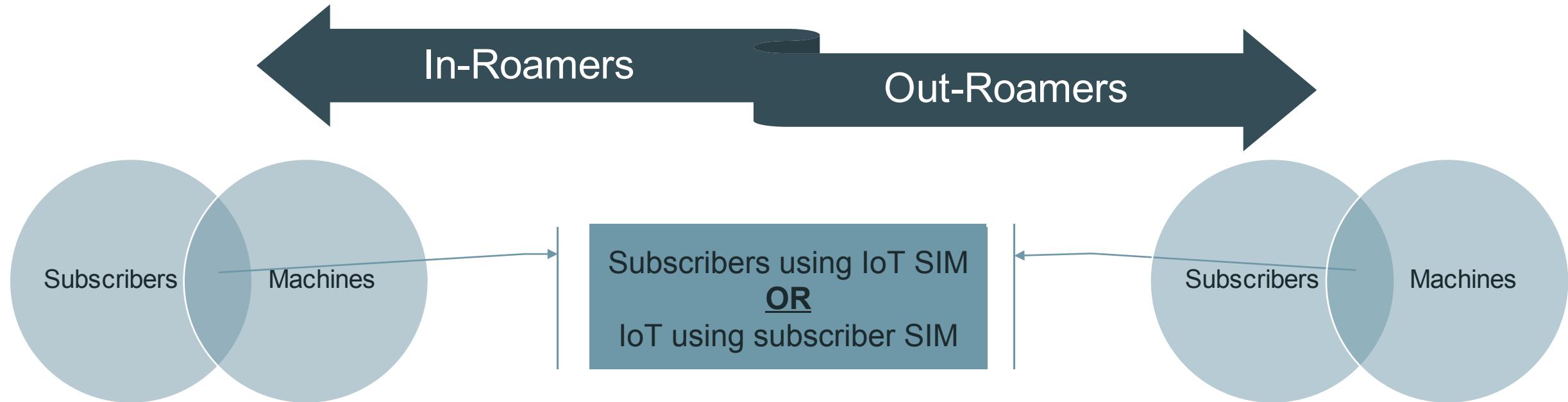


## European Union: CEPT ECC report 194 definition of Extra-territorial use of E.164 numbers and IMSIs

*"Extra-territorial use of E.164 numbers: Use of one country's E.164 numbers in another country on a permanent basis. E.g. in the context of M2M communications: use of numbers from country A (e.g. France) in electricity meters in country B (e.g. Belgium)".*



# Permanent Roamers



EU Roam-Like-At-Home scenario could have a positive or negative financial impact

## Travel SIM Companies (“Alternate Roaming Providers”)

Unauthorized IoT roaming usage could result in loss of global IoT business opportunities

Abusers & Fraudsters could fly “under the radar”

PR determination based *solely* on TAP usage will not uncover many PRs



# Different “Personas” of Permanent Roamers



Seasonal Workers /  
Cross Border Workers / OFW



Business Travelers /  
Business men with “local presence”



Retirees /  
Winter “migrants”



Students



IoT / M2M Devices

Each of them shows  
a different pattern in  
usage, signaling,  
duration of stay,  
seasonality of travel,  
etc.

And, of course, the  
Abusers and  
Fraudsters...



# Mobileum's approach to Permanent Roamer

## Presence and Consumption Module

- Build presence model for EU and Domestic.
- Build consumption model via real + non real time sources for EU and domestic consumption
- EU defined Permanent Roamer Logic based by join of Presence & Consumption Indicators

## Benefits Home Operator

- **Opportunity to levy Roaming Surcharge** of up to (excluding taxes)
- € 7.7 per GB per PR on Data
- 3.2 cents per minute for Voice
- 1 cent per SMS

## Real-Time Actions

- Notifications to potential abusers after 4 months (T Time period) observation period
- Notifications of applicability of roaming surcharge in T+2 weeks to final set of abusers



# Permanent Roamer: Rule Designer

Enables definition of Outbound / Inbound Permanent Roamer via Presence and Consumption objective indicators



## Presence Models

To detect subscriber location (Home / Roaming) and trip durations

## Consumption Models

To measure Roaming and domestic consumption

Type 1 Permanent Roamer

[View](#) [Construct](#)

MARK ALL ROAMERS AS "Permanent Roamer Outbound Type 1" WITH

Attribute Trip duration	Operator Less than or equal to	Value 20 days	Context In last	Context 60 days	Condition And
Attribute Visited countries	Operator Equal to	Value Germany	Condition And		
Attribute Roaming Usage	Operator Greater than	Value 75 % Pack Allowance			

*Intuitive Rule Designer to derive segments as per Business Requirements*



# IOT-PR detection fingerprinting approach

Combination of Deterministic and Analytics driven approach for IOT / M2M roaming device detection

## Deterministic Approach

Dedicated MCC/ MNC (IMSI range)

Extended MSISDN

Dedicated sub range of MNC

Dedicated APNs for M2M traffic

Device TAC

- Deterministic approach for Outbound M2M detection
- Operators assign static attributes to M2M devices

## Machine Learning Approach

Multiple IMSIs with same MSISDN

Periodic Patterns

Recurrent Usage Patterns (duration / volume)

PS only subscription

Fixed IP subscription

Static devices

- Machine Learning Approach to detect Inbound M2M (Static attributes not available from Roaming Partners)
- Supplement Deterministic Approach



# Evidence Pack for M2M Permanent Roamers

## Explaining Machine insights

**Roaming Analytics**

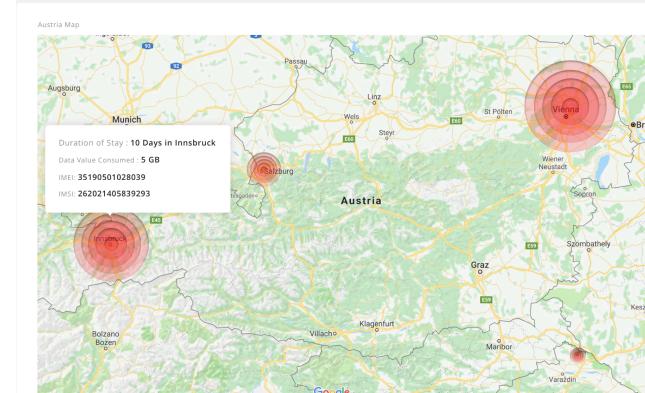
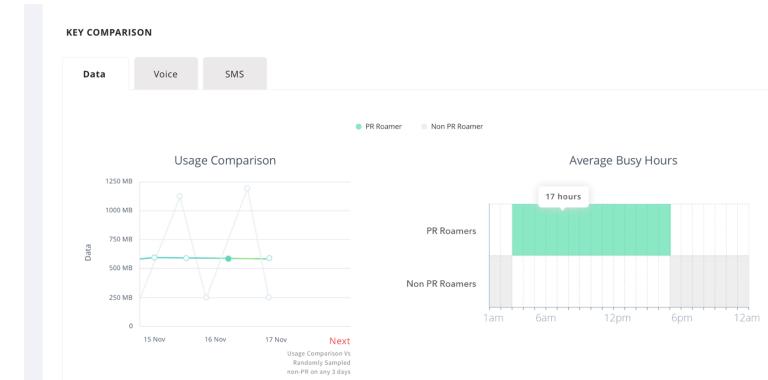
**PERMANENT ROAMER ANALYSIS**  
ID : PR-AUT-0234

**PR-AUT-0234 DETAILS**  
Created on 20 Dec at 3:17am  
Current State: Under Analysis  
Assigned to: Alex Sanders

**PERMANENT ROAMER ATTRIBUTES**

IMSI(S): 262021405839293* 262019931210625 262022104922398	Device Type: Sierra Wireless HiLoV2	Data Usage: 12.5 GB
IMEI: 35190501028039*	APN Used: iot.wireless.de, auto.web.at	MOU: 350 Mins
MSISDN(S): +49 1630 792 383 +49 1630 541 731 +49 1609 917 575	SMS Sent: 30	SMS Received: 30
Home MCC - MNC: 262 02 , Vodafone Germany	Location: Vienna, Innsbruck, Salzburg	Days in Roaming: 29
ML Classification: ● Red	MSU Sent: 5861	€ Revenue: 25
Behaviour: IoT	APN Used: iot.wireless.de, auto.web.at	
IoT Category: Plan:	Device Type: Sierra Wireless HiLoV2	
* - Primary Pairs		

## Usage and Mobility patterns



## Similar SIMs behaving as M2M Permanent roamers

### SIMILAR CASES

**PR -AUT-0235**

IMEI: 35190501028031  
Open on: 13 Sept  
Usage: 1650  
Category: ● Red

[View Detail](#)

**PR -AUT-0236**

IMEI: 35190501028032  
Open on: 20 Sept  
MOU: 1100  
Category: ● Red

[View Detail](#)

**PR -AUT-0237**

IMEI: 35190501028033  
Open on: 20 Sept  
Usage: 2000  
Category: ● Yellow

[View Detail](#)

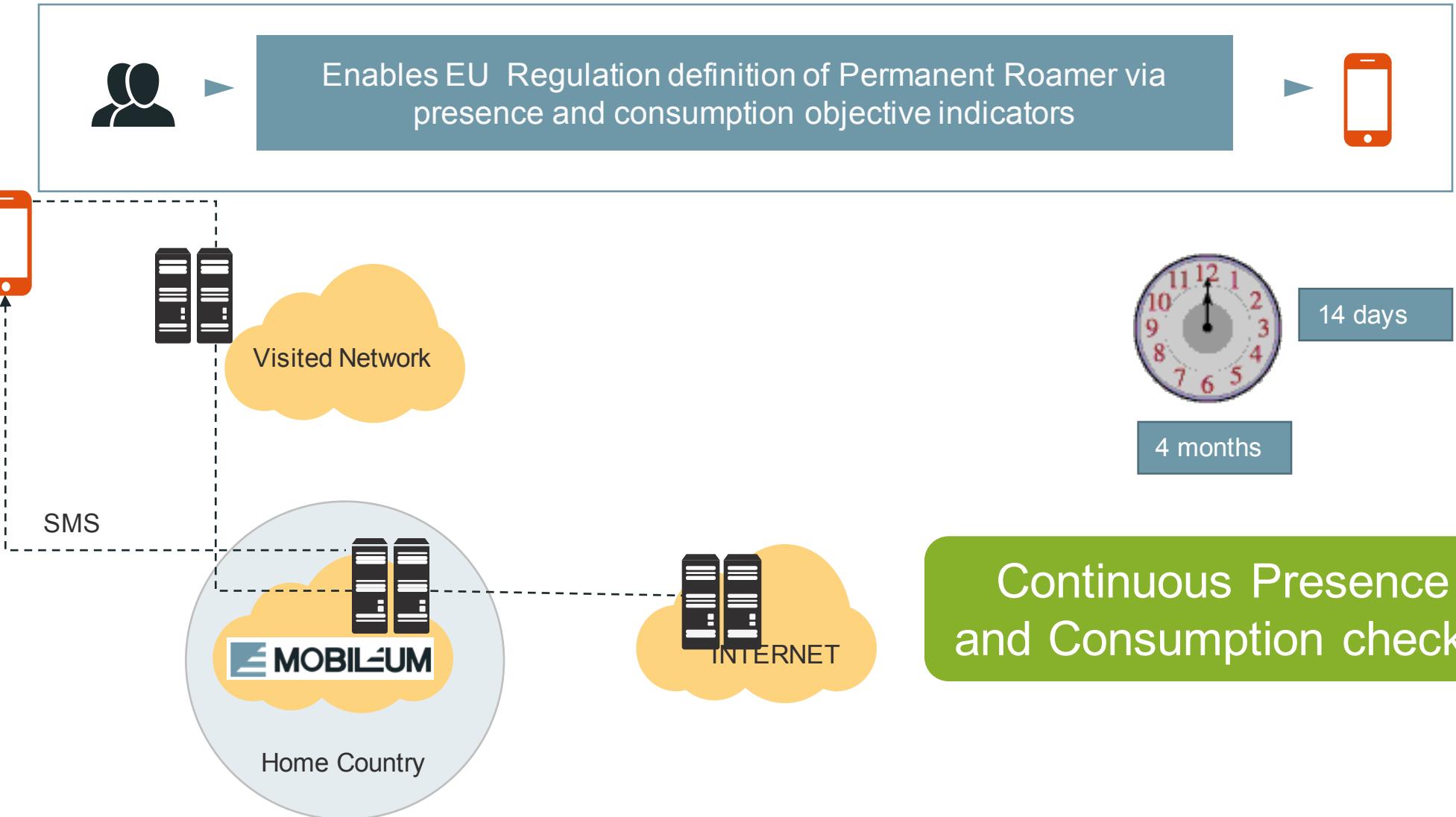
**PR -AUT-0238**

IMEI: 35190501028030  
Open on: 31 Oct  
MOU: 1500  
Category: ● Red



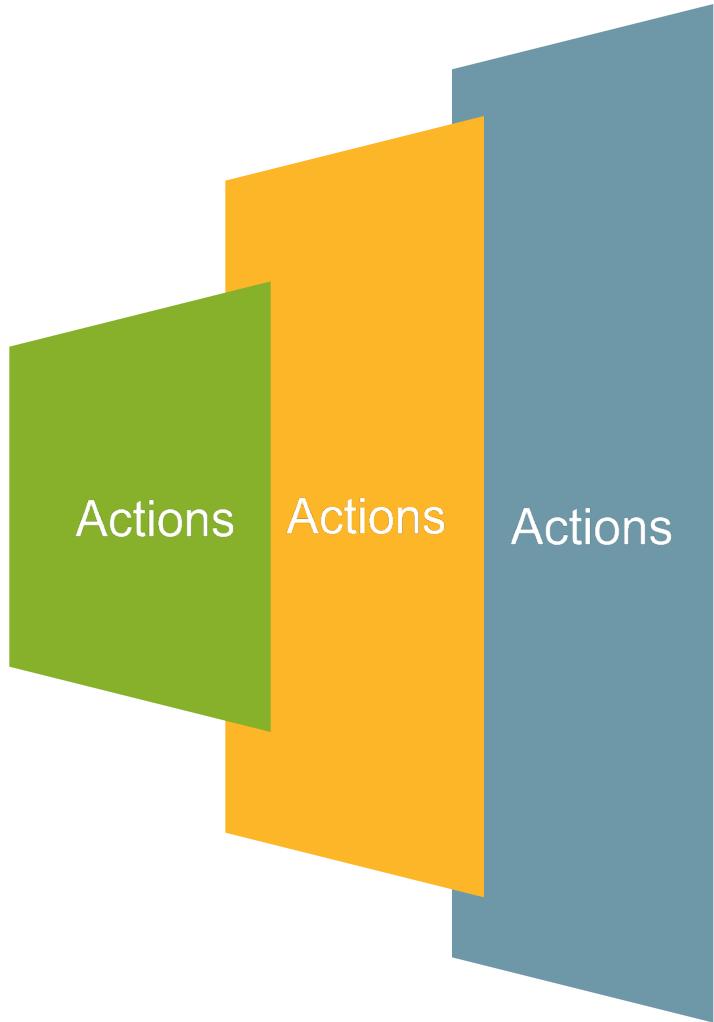


# PR Action : Notifications





# PR Action: Service Restriction for Out-roamers



Whisper announcement on MO calls

Deny MO calls

Deny MO SMS

Throttle data speeds

Deny data connection

Deny MT calls

Deny MT SMS

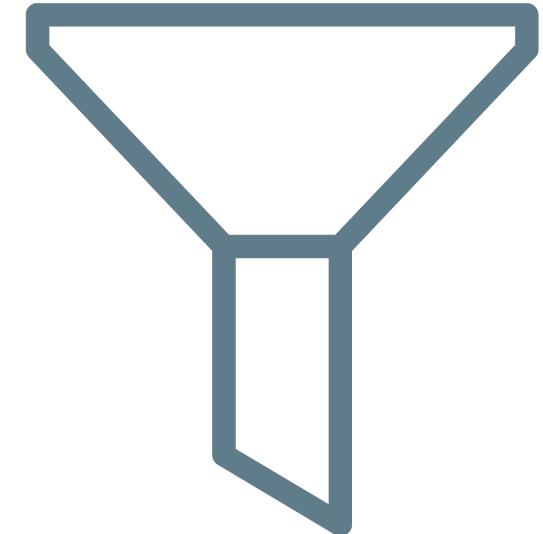


# PR Action: Roam Filter for In-roamers

In-roamers with no revenue but excessive signaling usage are "proactively encouraged to leave the network" by limiting their services

Can be done on a location basis:

For example: Congested area or area where local competitor may have overlapping coverage





THANK YOU