



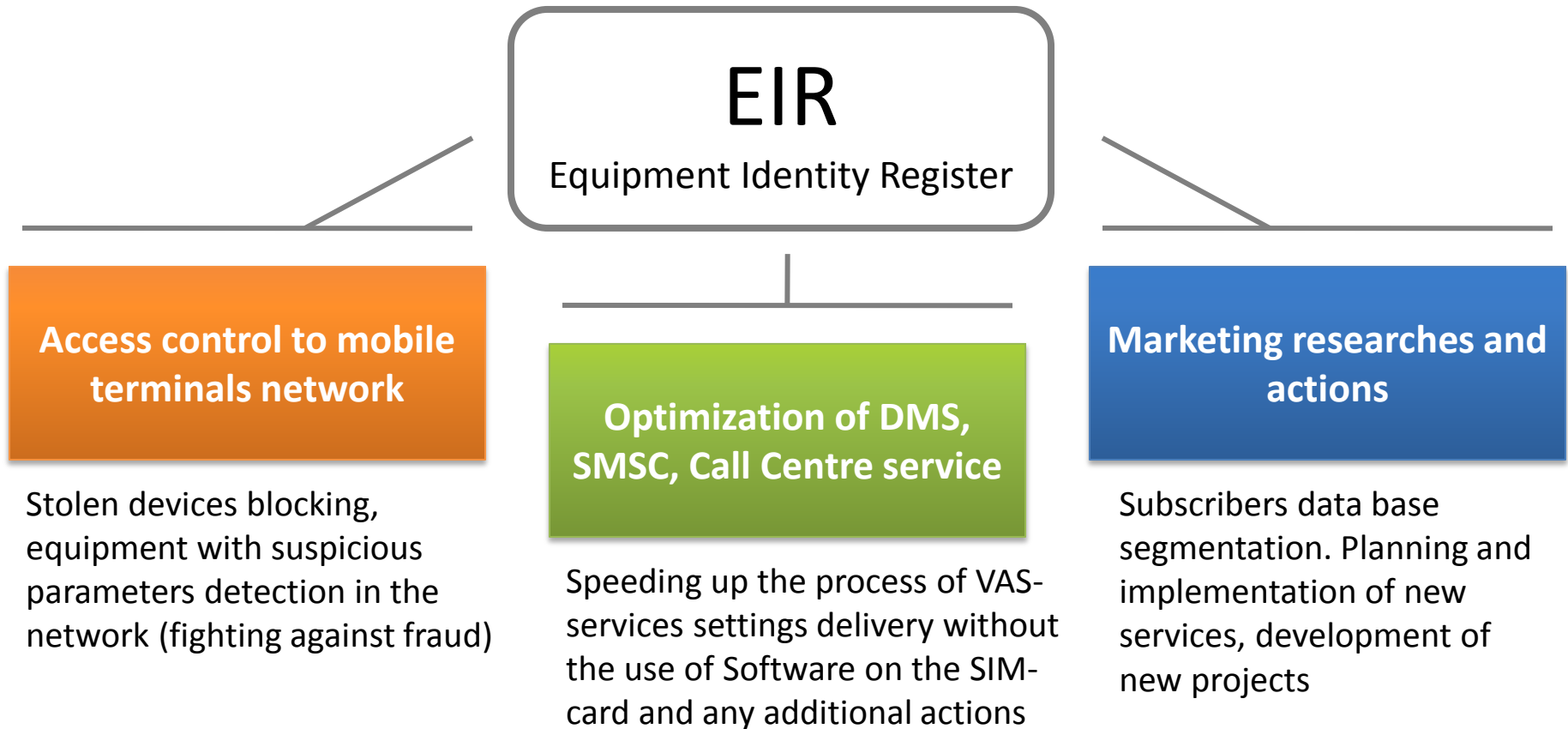
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Platform for subscribers and
terminals accounting

Krasnoyarsk, 2013

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Application





- 1** Reception and analysis of CheckIMEI and CheckIMEI Extended messages from MSC / VLR

To send a query to DMS system it is required that messages from the MSC / VLR contain IMSI and IMEI, and possibly (but not necessarily) MSISDN. Anomalies are checked: presence of the same IMSI (cloned SIM-cards) in the network, presence of identical or zero IMEI, presence of TAC not selected by GSMA (cross-flashed IMEI). All lengths IMEI / IMEISV specified in 3GPP TS 23.003 are supported.

- 2** Detection of a subscriber or specific equipment in the network with lists of IMEI, IMSI, MSISDN or TAC

It is supported generation of access to external platform through HTTP / SOAP-interface with MSISDN transmission (if it is available on the platform), IMEI and IMSI. Verification for compliance with each of the lists (IMEI, IMSI, MSISDN or TAC) can be performed for new detections and for all events CheckIMEI (i.e. prior to check the triplet's uniqueness).

- 3** Detection of new triplets IMEI-IMSI-MSISDN in the network and sending queries to DMS system, when they are detected (under 10 seconds after appearance)
 - 4** Preparing triplets caches IMEI / IMSI / MSISDN at the first launch or after a prolonged outage
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- 5** Detections filtering according to black or white lists and generation of responses to switching equipment

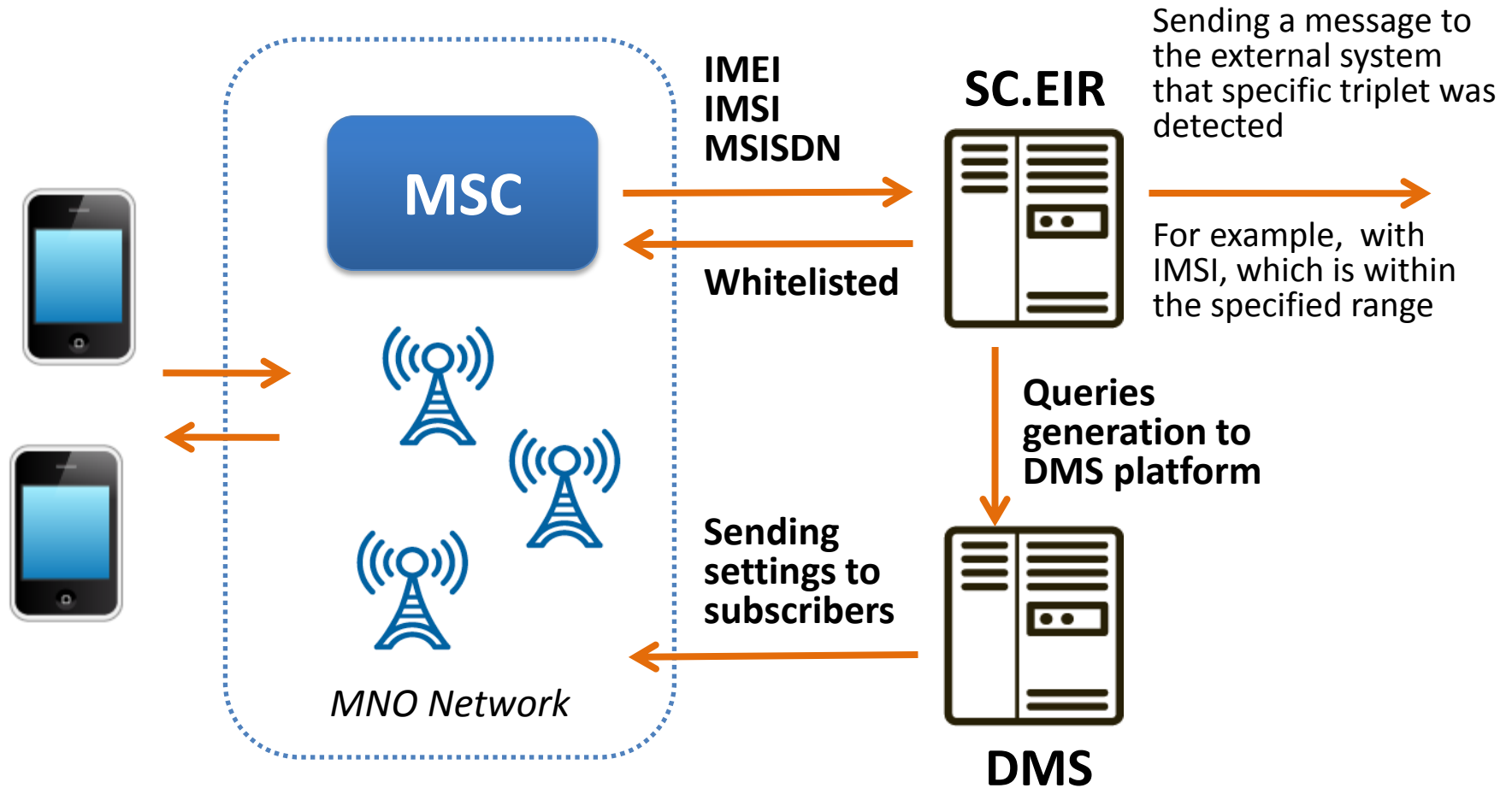
Access control rules are provided for mobile terminals to the network, based on the "black" and "white" lists by IMSI and / or IMEI (TAC)
- 6** Automated deletion of outdated detections. Ability to remove detections by administrator of the platform

Manual removal may be necessary to re-send the trigger to DMS (with the next CheckIMEI event). Instead, it is also possible to use the function in the administrator's web interface and to re-send trigger (available for each triplet)
- 7** Loading lists of IMSI-MSISDN from the billing

If it is impossible to get MSISDN of a subscriber from MSC / VLR, it is possible to obtain matching between IMSI and MSISDN, using information from the billing (it is needed to send triggers to DMS system)
- 8** Monitoring, logging and statistics collection
- 9** Data backup and other safety mechanisms
- 10** Administrator's web interface

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Logic of interaction





Example of statistical indications

It is possible to view the current statistics in the administrator's web interface for validation of the main functions correct performance and tracking some licensing indicators

Parameter	Region 1	Region 2	Region 3	Totally
Number of active subscribers by CHECK_IMEI	1251235	750256	5480040	18742431
Number of requests per minute on the DMS	49	0	14	63
Number of SMPP errors	0	0	0	0
Number of IMSI-IMEI bundles	1495525	798411	6511431	8805367
Number of MSISDN-IMSI bundles	1101389	2388987	932325	4422701
Number of events CHECK_IMEI per minute	1843	578	14259	16680
Number of triplets MSISDN-IMSI-IMEI	943229	35908	182256	1161393
Number of MSC with engaged transmission CHECK_IMEI	2	3	12	17
Percentage of active subscribers (unique IMSI on CHECK_IMEI) to the total base	87,4	31,4	95,8	

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Example of statistical indications



It is provided the view of statistics on MSC for settings validation

Data	Region	MSC	IMEI	IMEI+IMSI	IMEI+IMSI +MSISDN
12.10.2012 7:59:46	Macroregion 1	Switch 1	0	0	4
12.10.2012 8:39:58	Macroregion 1	Switch 2	0	0	2
12.10.2012 8:11:31	Macroregion 2	Switch 3	119	206521	0
12.10.2012 8:50:16	Macroregion 2	Switch 4	86	70235	0
12.10.2012 8:51:20	Macroregion 3	Switch 5	95	48149	0



Two modes of platform's operation

Emulator EIR

The main function is *the fast detection of new terminals in the network and DMS triggers generation for settings delivery*

Response sending is whitelisted

Other functions performing

Real EIR

The main function is *prevention of unauthorized equipment appearance in the network*

Check IMEI on lists (integration with Central EIR can be performed)

Response sending whitelisted/blacklisted

Other functions performing

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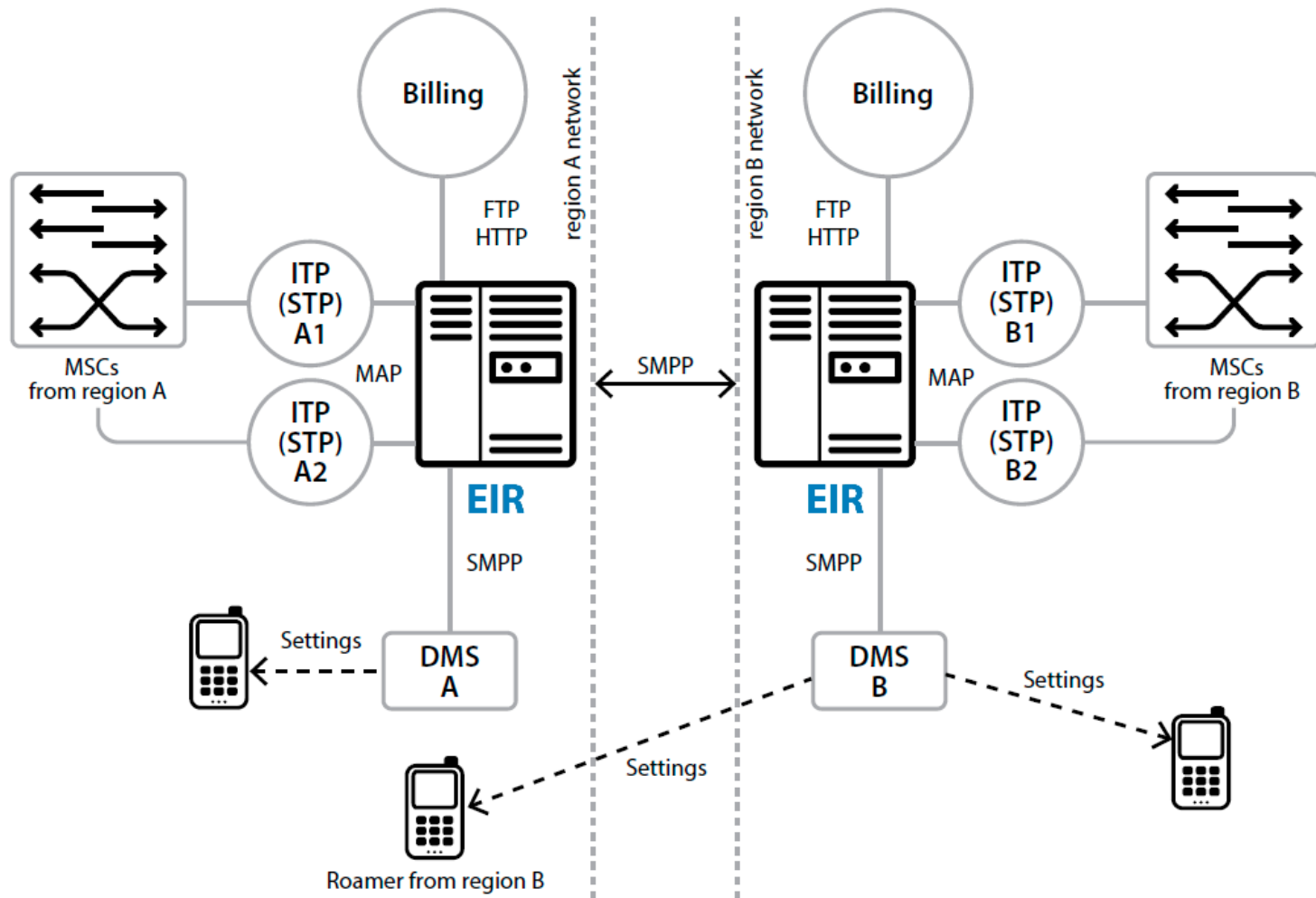
EIR use in different regions



- For combined operation of the platform in several regions the IMSI lists of belonging to the region shall be initiated for each installation
- Subscribers CheckIMEI from other region (roamers) are transferred to their “native” EIR
- Processing logic of CheckIMEI with IMSI, which are not on the lists, can be adjusted (to handle as local and to return blacklisted, etc.)

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Scheme of implementation (EIR in different regions)





- Creation and support up to date database of all subscribers and their terminals for further processing
- Possibility of interaction with MSC / MSS of different manufacturers, both directly and through STP
- Possibility of interaction with MSC / MSS through MAP protocol, both over SS7 networks, and through SIGTRAN-connection (M3UA)
- Possibility of automatic generation of trigger for DMS system, upon returning subscriber to one of his old devices
- Main data caching in memory for productivity speeding up and for CheckIMEI takes screening



The company's portfolio includes installations with the following maximum performance:

- storage of **40 million unique triplets**
- receiving **10000 MAP_CHECK_IMEI** operations / sec
- capability to send **1000 triggers / sec** to DMS
- reception of files or HTTP queries from the billing with updated bundles IMSI-MSISDN limited to **the half of the daily active subscriber database**

The actual performance of the solution depends on the MNO network and may be linearly increased through horizontal scaling of the system



- Increased efficiency of phones anti-theft and, as a result, increased loyalty of subscribers
- Speeding up the process of VAS-services settings delivery and, consequently, increased revenues from such services
- Increased penetration rate of the amount of customized settings of the operator's subscribers
- Load reduction on DMS, SMSC and contact center
- Removal from SIM-cards of specialized software to detect the phone change and to send request for new settings. The majority of settings will be sent without participation of subscribers
- Subscribers database segmentation for marketing campaigns



- **Extension of the functional to the DMS-system**

The platform acquires all features and benefits of DMS system of Svyazcom company (SMS-Settings). For example, it may contain its own SMSC for settings delivery, thereby reducing the load on in-service SMSC of the Customer

- **LBS (Location Based Services) function adding**

Besides the history of subscriber's terminals on the platform it will also be possible to obtain its location and the history of its movements. This information can be used in the standard mechanism of detection as well

- **Sending notifications to roamers - strange subscribers in the own network (integration with SMSC is required)**

Similarly it is possible to detect and notify own subscribers, which moved to another region

Equipment Identity Register of Svyazcom company

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