

**Source:** O<sub>2</sub>, T-Mobile, Orange, Ericsson.  
**Title:** Use of the Radio Access Technology (RAT) during background scanning  
**Agenda item:** 9.22  
**Document for:** Discussion and approval

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## **1. Introduction.**

Due to un-clarity in TS 23.122, CN1 has been discussing the use of the Radio Access Technology (RAT) during background scan procedure for PLMN selection. The discussion resulted in two different Rel-6 proposals:

1. To clarify that the Radio Access Technology information needs to be considered during the background scan procedure (the related CR is in Tdoc N1-040478).
2. To delete 'completely' from the 3GPP specifications the use of RAT for PLMN selection and background scan procedures. This requires stage 1, stage 2 and stage 3 changes. Additionally, this impacts several working groups (i.e. CN1, SA1, T1, GERAN3 and perhaps T3). (the related CR is in Tdoc N1-040494).

There was no consensus in CN1 on which approach should be taken. TSGN plenary has been asked to identify the preferred mechanism for PLMN selection (Tdoc N1-040444 in Tdoc N0-040024).

This contribution gives further thoughts on why the Use of Radio Access Technology needs to be preserved.

## **2. Discussion.**

This section presents the technical arguments concerning both proposals and also compares them from a service point of view.

- **Considering the Radio Access Technology information.**

During the last two CN1 meetings it has been stressed that most of the mobile manufacturers already implemented mechanisms using the Radio Access Technology information during background scan procedure for PLMN selection (as defined in TS23.122). To solve eventual hopping issues and impacts on existing mechanisms, some clarifications to TS23.122 have been proposed in Tdoc N1-040478 when considering the Radio Access Technology information during background scan procedure. Additionally, not only CR in Tdoc N1-040478 does not impact the E-PLMN feature, but it also clarifies that all access technology of PLMNs included in the E-PLMN list are regarded as equivalent.

Following discussion in CN1, it was concluded that the proposed CR in Tdoc N1-040478:

- clarifies the implementation of Mobile Stations regarding the use of RAT information during background scan procedure (already available in some 3G commercial products).
- solves eventual “Ping Pong” effect between access technologies.
- does not impact E-PLMN feature.
- does not impact the cell re-selection procedure under the operator control.

- **Not considering the Radio Access Technology information.**

Following discussion in CN1, it was concluded that the proposed CR in Tdoc N1-040494:

- clarifies the implementation of Mobile Stations regarding the use of RAT information during background scan procedure (already available in some 3G commercial products).
- solves eventual “Ping-Pong” effect between access technologies.
- does not impact E-PLMN feature.

However, it has to be underlined that this proposal also modifies the PLMN selection procedure at switch on and on recovery from lack of coverage, with the consequence that it changes the service requirements and it will require new functionality in Mobile Stations (i.e. it will require changes in the existing implementations).

- **Comparison of the two mechanisms from a service point of view.**

The section presents the differences between the two proposals from a service point of view, highlighting the fact that the procedure taking into account the Radio Access Technology information during the background scan procedure gives more possibility to the operators.

The following scenario is considered:

A user from a country Y is roaming in a country X where PLMN A (from operator A) and PLMN B (from operator B) are available. PLMN A and PLMN B both support 2G and 3G accesses.

The two colons under title 'PLMN/RAT Priority Order List' correspond to the Priority list as defined on the USIM.

The Status colon indicates if this PLMN with the corresponding RAT is available where the user is.

The two colons under title 'After Background Scan' indicate if the user will change of network or not after this procedure (depending on the fact that PLMN only information in the Priority list is considered or if the RAT information is also taken into account).

PLMN/RAT Priority Order list		Status	Registered PLMN	After Background Scan	
PLMN	Radio Access			PLMN only (N1-040494)	PLMN/RAT (N1-040478)
A	UMTS	Not Av.			
B	UMTS	Available	<b>X</b>		<b>X</b>
A	GSM	Available		<b>X</b>	
B	GSM	Available			

In the scenario proposed above the user is currently registered on PLMN B UMTS.

In this situation if the RAT is not considered in the background scan, the UE will perform a PLMN Re-selection to PLMN A GSM as PLMN A has higher priority than PLMN B. Consequently, the user will no be able any more to access UMTS services as PLMN A UMTS is not available where the user is.

If the RAT is considered then the UE will remain on PLMN B UMTS, as PLMN B with UMTS RAT is the available combination with the highest Priority rank and the user will continue UMTS service.

Other scenarios are detailed in the Annex.

**The non consideration of the Radio Access Technology will result in a bad user experience:**

- This is a tool the operator should be able to use if he wants to give priority to UMTS coverage to its UMTS subscribers when roaming.

- The non consideration of RAT leads to undesirable effects: The user will not be able to use UMTS services such as video telephony and higher data rates supported by UMTS access even when there is a UMTS coverage. This is a major concern for both operators and users.

- **Other possible mechanisms**

During the discussions in CN1 meetings, it was stressed that other existing solutions could be employed without having to consider the RAT during the background scan procedure to obtain the same result as for the scenario above:

1. The usage of different PLMN codes
2. The usage of cause#13.
3. The usage of E-PLMN feature.

These solutions are not seen as applicable for the following reasons.

1. Distribution of PLMN codes is under regulator control. A home network cannot be sure that all visited network use one PLMN code per radio access technology.
2. The usage of cause#13 is not possible in some national roaming scenarios where the location area cannot be barred (Please see the 'Particular national roaming case' slides in N1-040386).
3. The usage of E-PLMN feature is not possible in roaming scenarios where visited PLMNs are competitors and agreement cannot be made.

### 3. Conclusion.

It is proposed that TSGN discusses and agrees the Tdoc N1-040478 (CR 069rev4 on TS23.122) which clarifies the background scan procedure and:

1. Eliminates ping pong effect within the VPLMN,
2. Does not impact E-PLMN feature,
3. Gives a chance to the user for 3G service continuity while roaming,
4. Solves roaming issues when operators use a common PLMN code for different Radio access technologies.

**Note: Points 3 and 4 will not be possible without the usage of RAT.**

### 4. Annex: Additional examples of scenarios and results of the Background scan procedure

Example: With PLMN/RAT considered at Background scan procedure, the user will be able to use UMTS services by changing network (it stays on its Registered PLMN, which is PLMN A).

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A	UMTS	Not Av.			
B	UMTS	Available			<b>X</b>
A	GSM	Available	<b>X</b>	<b>X</b>	
B	GSM	Available			

Example: As the highest PLMN/RAT combination available is part of the current Registered PLMN, the user does not change PLMN, neither RAT, due to background scan procedure with both proposals.

PLMN/RAT Priority Order list		Status	Registered PLMN	After Background Scan	
PLMN	Radio Access			PLMN only (N1-040494)	PLMN/RAT (N1-040478)
A	UMTS	Available			
B	UMTS	Available			
A	GSM	Available	<b>X</b>	<b>X</b>	<b>X</b>
B	GSM	Available			