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| **Date issued: 27 March 2013****Source: ERICSSON****Subject: SE19\_27 − Proposed additional text of the working document (SE19(13)49 Annex 5)** |

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| SummaryThis contribution proposes a text to be added in Section 3.4.1 of the draft working document (Annex 5 of SE19(13)49 previous meeting report), dealing with asymmetric links.The scope of the present document is to better clarify the applicability and relevance of the cited “Ericsson Mobility Report” when referred to the matter in the scope of the working document from SE19.In particular the intention is of course to confirm the validity of the data reported in the Ericsson Report but at the same time to add some information to better circumstantiate the content.In short Ericsson would like to clarify that:* The data reported in the Ericsson Mobility Report are referred to mobile end user traffic data, and that the measures have been conducted on the RAN network side
* That Mobile Network settings are made with the assumption that Backhaul network is never a bottleneck for the traffic, and must be dimensioned to support traffic peaks without causing additional delays
* That 3GPP standards assume symmetric traffic from/to the backhaul network

With the above clarifications Ericsson would like to remark the possible misunderstanding when translating the current asymmetric nature of mobile user data traffic into a guideline for an asymmetric planning of the backhaul network.Just for information, some final considerations on the future evolution of mobile networks are shortly mentioned. |

**Ericsson proposal for section “3.4.1 Literature on asymmetry” of the working document (SE19(13)49 Annex 5)**

In the current version of the working document (SE19(13)49 Annex 5), there’s a section in 3.4.1 dedicated to the Ericsson Mobility Report. Here in the following the current version of the working document is reported and some additions (highlighted in blue) are proposed to be inserted at the end of the section dedicated to Ericsson report.

“3.4.1 Literature on asymmetry

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**ERICSSON REPORT**

Another important input has been provided by Ericsson, in its Mobility Report [11]. Ericsson states in this Report that “today more than 40% of the world mobile’s traffic goes through Ericsson networks and we support customers’ networks servicing more than 2.5billion subscribers”.

The report presents the global results of the measured traffic and its asymmetry. We provide below a quote summarizing the Ericsson’s conclusions on these aspect:

“*Depending on the popularity of different applications and terminals, the overall ratio of uplink traffic volume can vary a lot between networks. However, it can be as low as 10% in networks where there is a lot of HTTP video usage and can reach up to 25% in mobile PC-dominated networks with a lot of P2P file sharing or P-P TV usage.*

*In most measured networks, there have been no major changes in uplink-downlink traffic ratios for the past two years. However there are few exceptions, the ratio of uplink traffic volume has slightly decreased in a few mobile-PC dominated networks with high P2P application usage (mainly in Asia). This is a result of increased smartphone traffic volume shares and hence decreasing P2P traffic share from mobile PC. On the other hand, the proliferation of online storage services (such as Google Drive and iCloud) and increasing popularity of mobile photo and video uploads to social networking sites will increase the uplink traffic volumes in the future*”

The following picture and its description is reproduced from this Report summarizes the DL/UL asymmetry per application. The variation of the results reflects the different results obtained in different networks.

Measurements have been performed at the edge of the packet core network; results for the radio interface will differ slightly (higher uplink traffic ratios) due to additional protocol data headers.



Figure 6: Ratio of uplink traffic volume for different applications (Source Ericsson [11])

Example of how to read this graph: the highest ratio of uplink traffic volume for P2P file sharing in one network was around 50 percent.

It can be seen that a high number of applications is download dominated; among them HTTP video, HTTP audio, Software update, Android market, iTunes. The UL average traffic percentage is less than 5%,.

The application categorized as request-response, including WEB browsing, email and social networking have an average asymmetry of 5:1.

Finally, a less used category including P-to-P TV and P-P file sharing are rather symmetrical. However, Ericsson mentions also that:
*Many applications have popular P2P equivalents motivated by savings on infrastructure cost. For example, Skype for VoIP, PPStream or PPLive for online TV, Spotify for online audio, BitTorrent for file sharing. In P2P systems, content is not provided by dedicated servers but by other regular users (peers) in the system*.

Another important conclusion in the report, which is directly reflected in the capacity (and the spectrum) required by the wireless backhauling links is shown in the Figure 7:



Figure 7: Global mobile traffic: voice and data 2010-2018 (Source: Ericsson [11])

From the Figure 7it can be seen an increase of more than 10 times between 2012 and 2018, increase which is consistent with other predictions presented above and which will put a high pressure on the spectrum resource for the backhauling links.”

However Ericsson clarified that the current characteristics of the mobile user’s data traffic should be carefully used for defining the planning strategies for mobile backhaul networks.

The Mobility Report talks about subscribers and subscriber data. It is based on monitoring of Ericsson controller nodes which provide services to end users.

Backhauling systems (Microwave FS) do not provide services directly to subscribers, but services to RAN systems that are configured assuming to connect to symmetric links.

The basic assumption [(on which most of the operators and manufacturers agree…or???)] is in fact that the backhauling network should never become a bottleneck for traffic. That implies it should be dimensioned in order to support traffic peaks and to avoid delays due to high congestion.

Moreover, that should be done trying to take into account the likely future evolution of traffic towards a more balanced ratio between UL and DL and in order to avoid the necessity to rebuild the networks architecture after a few years.

**Additional considerations on future evolutions of mobile networks**

Among future factors that will very likely reduce the asymmetry of traffic, it could be mentioned

* Evolution towards “converged networks”, where different types of services and technologies will combine into a single seamless multi purpose network architecture
* The 3GPP has standardized solutions of "local breakout" (LIPA (Local IP Access), SIPTO (Selected IP Traffic Offload), etc.) in which part of the Internet data traffic (which is the one most often asymmetric) is terminated separately, with a dedicated gateway. What remains to be transported to the operator is then the less asymmetric.
* D2D (device-to-device) solutions are under study in 3GPP, in which the traffic is terminated between 2 terminals either locally or through their respective stations, without passing through the Core Network. So the back and forth through the backhaul are clearly symmetrical.
* Most aggressive heterogeneous scenarios in LTE Networks, with soft cells, eICIC (enhanced Inter-cell Interference Coordination), CoMP (Coordinated Multi-Point), etc., always assume a direct symmetrical channel between eNBs. If not, you would have a penalty "one way" of one of the two eNBs and the performance in many cases would remain inefficient. As a matter of fact, X2 interface is used for traffic control that is a small part, but is also used for data forwarding during handovers, that could make challenging to have "asymmetric" configurations.