

Comments of BSNL

SN	ISSUES FOR CONSULTATION	REMARKS
1	Whether there is a need to define a particular user equipment or architecture to be used by the vendors or this may be left to the market forces.	An open policy of permitting multiplicity of UE vendors is also important for delivering values to the subscriber at most competitive prices. LTE user equipment has to meet certain performance characteristics before it is permitted to enter a network such as inter-operability, protocol conformance and emission tests. However Interface should be compatible with the existing network.
2	Whether there is a minimal set of performance characteristics the UE has to meet before it is permitted to enter a network? These characteristics are over and above the inter-operability, protocol conformance and emission tests which presumably the UE has already passed.	LTE is next to 3G. The strategy as adopted for transition from 2G to 3G for user equipment may be adopted in case of transition from 3G to LTE.
3.	In addition to what has been described above, what can be the other security issues in IMT-Advanced services? How these security issues can be addressed?	LTE is expected to make extensive use of user installed Femto cells, security and privacy in such networks is required at air interface, operator's internal network and inter-operator links. Protections from unauthorized access, denial of service as well as theft of service are just a few issues to name. Mutual authentication of base station as well as mobile station is required for data protection, integrity and privacy. Femto cell should be operable within a Service area of the service provider. Moreover a separate framework of security requirement may be worked out by TEC and same should be enforced to all operators as one of the pre-requisite to launch of the service.
4.	What basic security frameworks should be mandated in all networks to protect customer?	In addition to 3 above, Enhancement to 3G security, Extended authentication and key agreement, more interworking security, additional security for evolved Node B (eNB), security at application layer. Basic frameworks as defined in 3GPP and ETSI should be mandated in all networks. Implementation of advanced forward error correction coding scheme should be considered. Examples are Turbo codes [Berrou93] and LDPC (Low Density Parity Check) codes [Gallager62]. Hybrid ARQ (Automatic Repeat Request) is another technique for spectrum efficiency and reliable link. An end to end security system will be implemented by using TLS (Transport Layer Security), SSL (Secure Sockets Layer) and IPsec (Internet Protocol Security). Security aspects

		<p>include:</p> <ul style="list-style-type: none"> • Mutual Authentication • Authentication / Credentials of user or device • Data confidentiality • Message Integrity and Origin authentication • Maintain security association across networks without losing connection • Protection against replay attacks • Privacy and Integrity <p>Moreover a separate framework of security requirement may be worked out by TEC and same should be enforced to all operators as one of the pre-requisite to launch of the service.</p>
5.	Which spectrum bands should be identified for the IMT-Services in India?	<p>700 MHZ band. It is suitable from the point of both capacity and coverage. This spectrum would require fewer base stations, meaning less capital investment and operational expenditure is needed to bring broadband to all areas.</p> <p>In rural areas the Band may be allotted to two operators (one PSU and one Private operator).The spectrum allotted in rural areas may be allowed to share, through active sharing of Radio Network by any other Operator. In Urban Areas, available higher band of 2.3/2.6 GHz may be auctioned to willing operator.</p>
6.	What should be the block size of spectrum to be put on auction? How many blocks of spectrum should be allocated/ auctioned per service area?	<p>Block size should be 2 X 5 MHZ carrier in FDD mode and 10 MHZ in TDD mode.</p> <p>In rural areas Block Size of 10MHz and in Urban Areas 20MHz can be put on auction. There should be Minimum Two and Maximum of Four Block should be allotted per service area.</p>
7.	What is the minimum spectrum block size for effective use of 4G technologies?	<p>Block size should be 2 X 5 MHZ carrier in FDD mode and 10 MHZ in TDD mode. In rural areas 10MHz and in Urban Areas 20MHz.</p>
8.	What should be the maximum amount of spectrum which a service provider can be allocated through auction?	<p>2 X 10 MHZ in FDD mode and 20 MHZ in TDD mode. In addition to 2G/3G spectrum, Maximum 20MHz should be allotted for BWA/IMT (Advanced) to one service provider.</p>
9.	Whether there is a need to specify the use of particular duplexing scheme based on the band in which spectrum allocation is done? If yes, in the case of TDD, is it required to specify further the frame duration, mandate frame synchronization using one of a specified set of timing sources and a permissible set of Uplink/Downlink sub-frame schemes compatible with the	<p>As per availability of paired/unpaired spectrum, duplexing mode can be opted. Network parameter like frame duration, synchronization etc need to be mandated by policy.</p>

	IMT-A standards?	
10.	What should be the reserve price per MHZ in different spectrum bands?	Lowest Annual charges in case of 3G spectrum. Charges should be NIL for BSNL keeping in view the social obligations. On the other hand it should be fair and reasonable. There should be an upper Cap to avoid high cost of service and increasing broadband penetration.
11.	What should be the eligibility conditions for bidding of spectrum?	Same in case of 3G. One carrier should be reserved for BSNL and all service providers (Basic/CMTS/NLD/ISP etc.) should be eligible.
12.	Should there be any roll out obligations for spectrum given through auction? Should it be different in different bands?	Yes, there should be roll out obligations for spectrum. Operators should fulfill measures set by TRAI for LTE services. Providing minimum number of connections in each village shall be roll out obligation. In case there is no willing customer to take connection in that case operator should open their own managed BWA PCO in each village and these PCO can be utilized for different purpose such as industry oriented training, education etc.
13.	Whether there should be any specific rollout obligations in respect of rural areas?	Yes, there should be roll out obligations for rural areas. Rollout obligations as defined in NTP. Providing minimum number of connections in each village shall be roll out obligation. In case there is no willing customer to take connection in that case operator should open their own managed BWA PCO in each village and these PCO can be utilized for different purpose such as industry oriented training, education etc.
14.	What should be the spectrum usage charges? Should it be based on revenue share or be a fixed charge?	It should be based on revenue share for private operators. For BSNL spectrum usage charges should be Nil.
15.	Using MIMO technology what can be the possible infrastructure sharing issues and what can be the probable solutions?	A policy on Passive/Active infrastructure provider should be framed in which MIMO technology aspect should be dealt.
16.	What regulatory mechanisms are to be provided for delivery of voice services over IMT-A systems?	It should support stationary (0 kmph) , pedestrians (10kmph) ,vehicular (120 kmph) and high speed vehicular (350 kmph) environments. For low mobility the performance should be optimized where as there should be minimal degradation during high mobility. For speeds greater than 120 km/h system should be able to maintain connection. Handover between heterogeneous networks should be possible.
17.	Should the interoperability of services to legacy 2G/3G systems be left to market forces?	No, interoperability of services to 2G/3G systems is required for optimal utilization of resources.
18.	What are the QoS measurements that can	<ul style="list-style-type: none"> Provision of QOS requirements as per user's demand. QoS to be matched with

	<p>be reported on IMT-A systems? Suggest the appropriate KPI for data and voice services to guarantee customer satisfaction.</p>	<p>those of wired communication and supports global roaming. User QoS and policy requirements.</p> <ul style="list-style-type: none"> • End-to-end QoS • Link layer QoS • Capability to distinguish between different service flows and satisfying the QoS for each flow. • Dynamic creation, modification and deletion of QoS flows • Admission control, traffic mapping and negotiation of QoS parameters
<p>19.</p>	<p>In view of the likely deployment of scenarios where the cell radius is scalable to much smaller levels using the concepts of femto and pico cells:</p> <p>a. What will be the impact of femto cells/ SoN architecture on KPI?</p> <p>b. What will be the impact of Relays/femto cells on spectrum policy?</p> <p>c. What will be the impact on infrastructure sharing?</p> <p>d. What policy guidelines are required to encourage low emission low energy and high capacity architecture like femto cells overlaid over macro cells?</p>	<p>a. KPIs for interference and radio resource management to be set. Need for optimized and balanced interworking between macro and Femtocells to minimize unnecessary handovers.</p> <p>b. There are implications for radio planning as well as for the operations and maintenance interface to the eNB. Need for cognitive methods to reduce interference to the macro network. Need for radio resource management required.</p> <p>c. Femto cell connection back into the core network is provided locally by an existing DSL internet connection rather than over the air back to the macrocell. Femto cell sharing is not possible as there is no obvious solution for cross network Femtocells.</p> <p>d. A Femtocell can be installed outside coverage area. This can be used extensively in rural areas where DSL exists but not the coverage of the preferred cellular operator. It can be promoted in dense areas to provide high data rates and capacity. Security concerns-backhaul protection, device and user authentication. Verification of geographic location and roaming aspects.</p>