Telecommunication Technology Vs E-Waste Generation Reports Globally

Mr. T. Udhayakumar .
SRM University Scholar - Faculty of Management
udhayakumart@gmail.com

Co-Authors
Dr. R. Krishnaraj
Assistant Professor SRM University Scholar- Faculty of Management
Dr. P. Parthasarty
MD–E-Parisaraa Pvt Ltd. - E-waste Recycling Pvt Limited,

How does mobile communications works from base station to subscribers

A mobile phone is an electronic device used for mobile telecommunications over a cellular network of specialized base stations known as cell sites. A cell phone offers full Duplex Communication and transfer the link when the user moves from one cell to another. As the phone user moves from one cell area to another, the system automatically commands the mobile phone and a cell site with a stronger signal, to switch on to a new frequency in order to keep the link.

Mobile phone is primarily designed for Voice communication. In addition to the standard voice function, new generation mobile phones support many additional services, and accessories, such as SMS for text messaging, email, packet switching for access to the Internet, gaming, Bluetooth, camera with video recorder and MMS for sending and receiving photos and video, MP3 player, radio and GPS.

Signal Frequency in Cell Phone

The cellular system is the division of an area into small cells. This allows extensive frequency reuse across that area, so that many people can use cell phones simultaneously. Cellular networks has a number of advantages like increased capacity, reduced power usage, larger coverage area, reduced interference from other signals etc.

FDMA and CDMA Systems

Frequency Division Multiple Access (FDMA) and Code Division Multiple Access (CDMA) were developed to distinguish signals from several different transmitters. In FDMA, the transmitting and receiving frequencies used in each cell are different from the frequencies used in the neighboring cells. The principle of CDMA is more complex and the distributed transceivers can select one cell and listen to it. Other methods include Polarization Division Multiple Access (PDMA) and Time Division Multiple Access (TDMA). Time division multiple access is used in combination with either FDMA or CDMA to give multiple channels within the coverage area of a single cell.

Codes in the Mobile Phone

Mobile phones have special codes associated with them. These include:

Electronic Serial Number (ESN) - unique 32-bit number programmed in the phone

Mobile Identification Number (MIN) – 10 digit number derived from the phone's number.

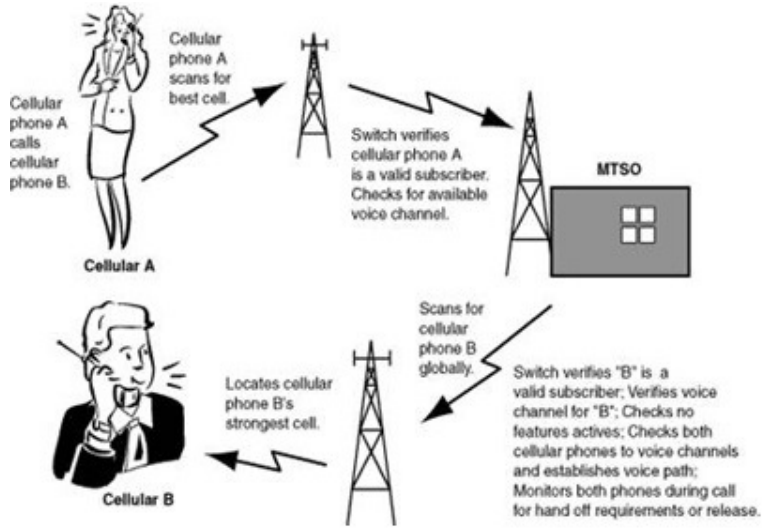
System Identification Code (SID) – unique 5 digit number that is assigned to each carrier by the FCC.

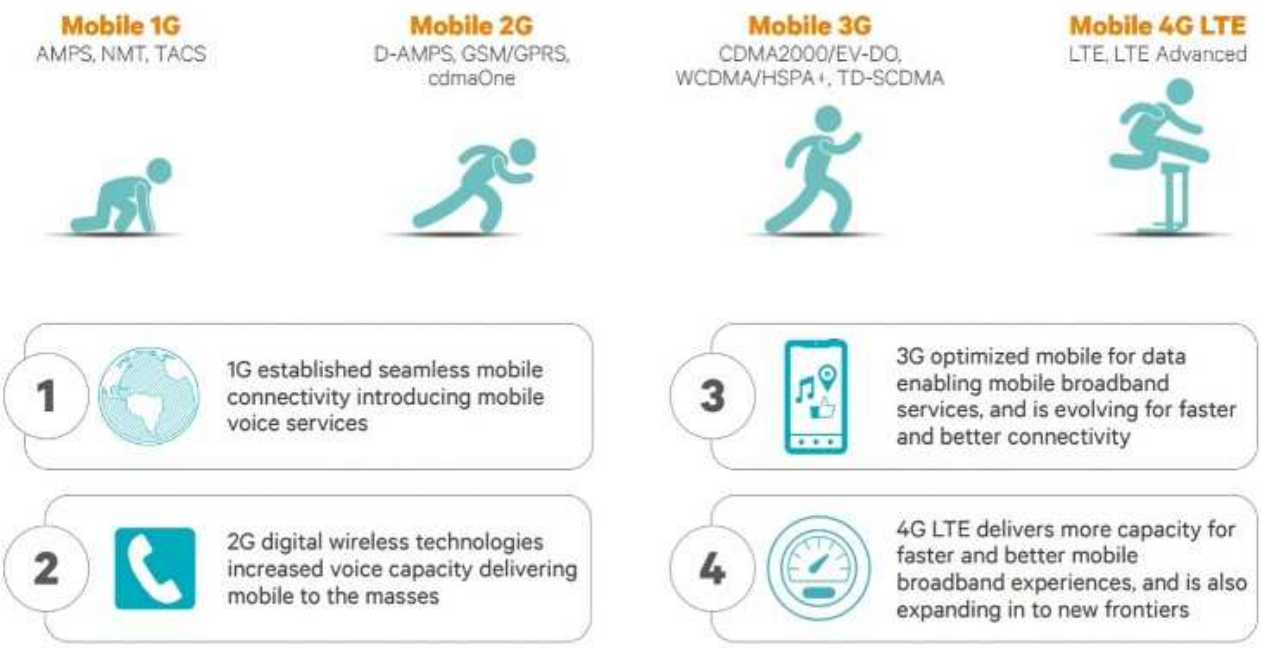
ESN is a permanent part of the phone while MIN and SID codes are programmed in the phone when a service plan is selected and activated.

Mobile phone is a Duplex device. When we use one frequency for talking, a second separate frequency is used for listening. So that both the people on the call can talk at once. The Mobile phone can communicate on 1,664 channels or more. The Mobile phones operate within the cells, so that it is easy to switch on to different cells as they move around. A person using a cell phone can drive hundreds of kilometers and can maintain a conversation during the entire time because of the cellular approach.

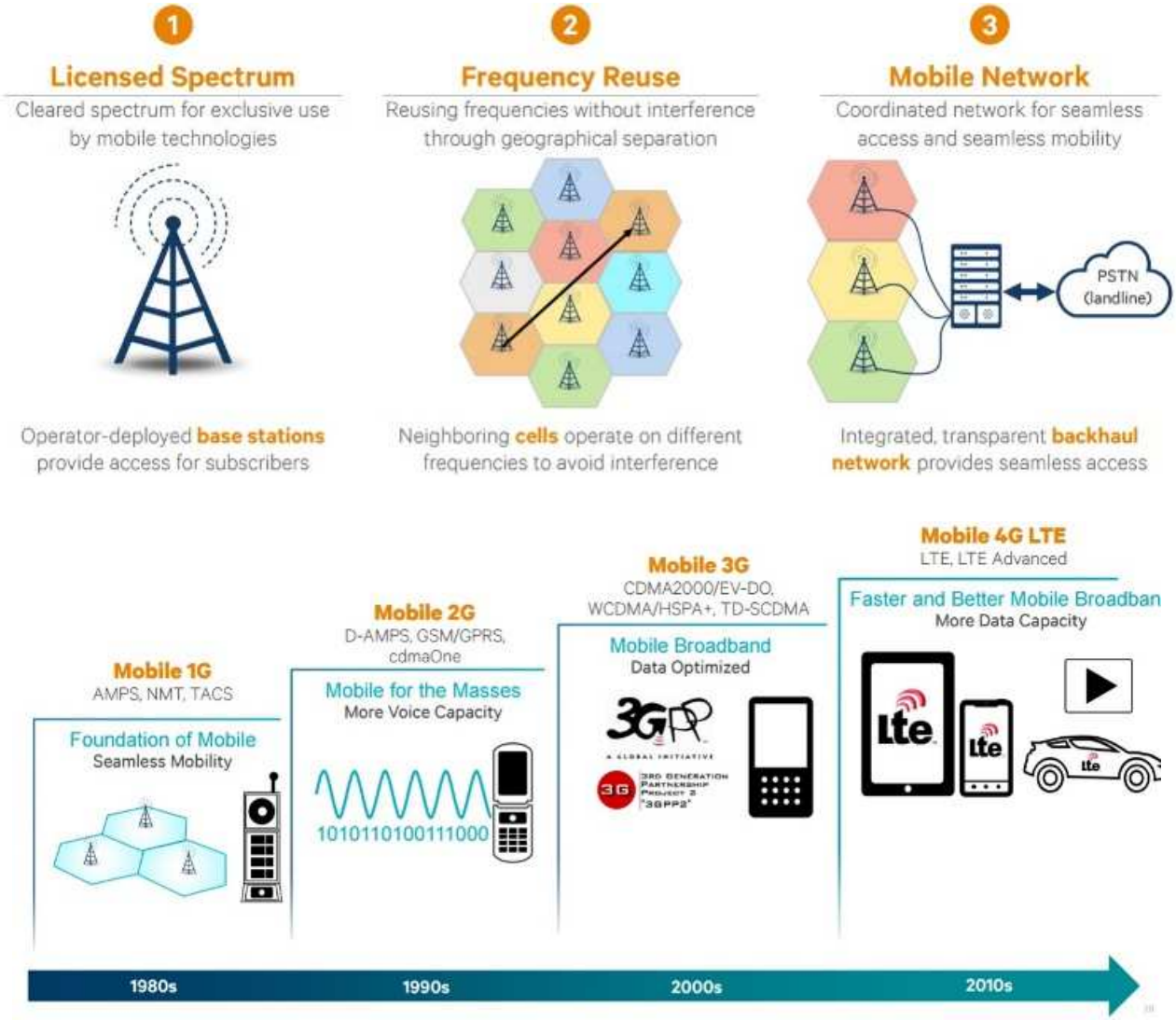
What happens when we make a call?

1. When we switch on the mobile phone, it tries for an SID on the Control channel. The Control channel is a special frequency that the phone and base station use to talk to one another. If the Mobile phone finds difficulty to get link with the control channel, it displays a "no service" message.
2. If the Mobile phone gets the SID, it compares the SID with the SID programmed in the phone. If both SID match, the phone identifies that the cell it is communicating is the part of its home system.
3. The phone also transmits a registration request along with the SID and the MTSO keeps track of your phone's location in a database. MTSO knows in which cell you are when it wants to ring the phone.
4. The MTSO then gets the signal, it tries to find the phone. The MTSO looks in its database to find the cell in which the phone is present. The MTSO then picks a frequency pair to take the call.
5. The MTSO communicates with the Mobile phone over the control channel to tell it what frequencies to use. Once the Mobile phone and the tower switch on those frequencies, the call is connected.
6. When the Mobile phone move toward the edge of the cell, the cell's base station will note that the signal strength is diminishing. At the same time, the base station in the cell in which the phone is moving will be able to see the phone's signal strength increasing.
7. The two base stations coordinate themselves through the MTSO. At some point, the Mobile phone gets a signal on a control channel and directs it to change frequencies. This will switch the phone to the new cell. [1][2]





Mobile 1G established the foundation of mobile



Who are all service providers world-wide?

The world's top ten telecommunications companies each have a market value of more than $50 billion. Servicing the world's ever-growing telephone and wireless connection needs, the telecommunications industry is forecast to continue to expand operations on a global level. More individuals in emerging markets are signing up for telephone and Internet contracts, while new telecommunications technologies in developed nations are expanding pre-existing customer bases of providers. While several company attributes can distinguish the top telecommunications companies in the world, market value serves as the determining factor that arranges this list of the top ten telecommunications companies.

1) China Mobile Ltd.
2) Verizon Communications Inc.
3) AT&T Inc.
4) Vodafone Group plc
5) Nippon Telegraph & Telephone Corporation
6) Softbank Group Corp.
7) Deutsche Telekom AG
8) Telefonica S.A.
9) America Movil
10) China Telecom

http://www.investopedia.com/articles/markets/030216/worlds-top-10-telecommunications-companies.asp

What is their share contribution?

With daily increasing subscriber base, there have been a lot of investments and developments in the sector. The industry has attracted FDI worth US$ 23.92 billion during the period April 2000 to December 2016, according to the data released by Department of Industrial Policy and Promotion (DIPP). Some of the major developments in the recent past are:

- Bharti Airtel will buy Telenor's India operations in seven circles to receive 43.5 megahertz (MHz) spectrum in the 1800 MHz band.
- Apple plans to produce iPhone SE at an upcoming facility in Bengaluru, owned by its partner Wistron.
- Ortel Communications, Odisha's largest multi-system operator, plans to invest around Rs 300 crore (US$ 45 million) over the next two years, for upgrading its infrastructure, along with strengthening its reach, efficiency and competitiveness in the market.
- Reliance Communications Limited (RCom) has signed a binding agreement with Brookfield Infrastructure Partners to sell a 51 per cent stake in Reliance Infratel, RCom's tower unit, for Rs 11,000 crore (US$ 1.65 billion).
- Private equity giant KKR & Co LP and pension giant Canada Pension Plan Investment Board (CPPIB) are in talks to acquire a significant stake in Bharti Infratel, which is expected at around US$ 4 billion.
- Chinese smartphone manufacturers, Oppo and Vivo, have both planned to invest in setting up large scale manufacturing capacity in the state of Uttar Pradesh in India, with an aggregate investment size of Rs 4,000 crore (US$ 600 million).
- Samsung India has expanded its service network to over 6,000 talukas across 29 states and seven union territories in India, by introducing over 535 service vans equipped with engineers, key components, diesel generator (DG) sets and key equipment, for providing quick response and on-spot resolution.
- LeEco, a Chinese technology company, has entered into a partnership with Compal Technologies and invested US$ 7 million to set up manufacturing facility at Greater Noida in order to start manufacturing Le2 smartphones in India.
- Chinese telecom gear maker Huawei has set up its largest global service centre (GSC) at Bengaluru in India, with an initial investment of Rs 136 crore (US$ 20.4 million), which will extend its support to Huawei's domestic and international telecom carrier customers in about 30 markets across Asia, Middle East and Africa.
- Chinese smartphone maker Gionee, which currently assembles smartphones in partnerships with contract manufacturers Foxconn and Dixon, plans to invest Rs 500 crore (US$ 75 million) to set up a manufacturing facility in India.
- Singapore Telecommunications Limited (Singtel), the major shareholder in Bharti Airtel, announced that it has signed an agreement with its majority owner Temasek Holdings Private Limited to purchase a 7.39 per cent stake in Bharti Telecom Limited, the parent company of Bharti Airtel Limited, in a deal worth US$ 659.51 million.
- Axiata Digital, a subsidiary of Malaysia's largest telecom firm Axiata Group Berhad, has made its entry into Indian e-commerce market by investing Rs 100 crores (US$ 15 million) in Bengaluru-based StoreKing.
- Chinese smartphone manufacturer OnePlus has partnered with Foxconn to start manufacturing its products in India as part of its plan to have 90 per cent of the devices sold in India to be locally manufactured by the end of 2017.
- Government of India to make a windfall gain from sale of spectrum in 2016-17 and achieve its fiscal deficit target of 3.5 per cent of GDP for the year. [3]

What are the mobile phone policies?

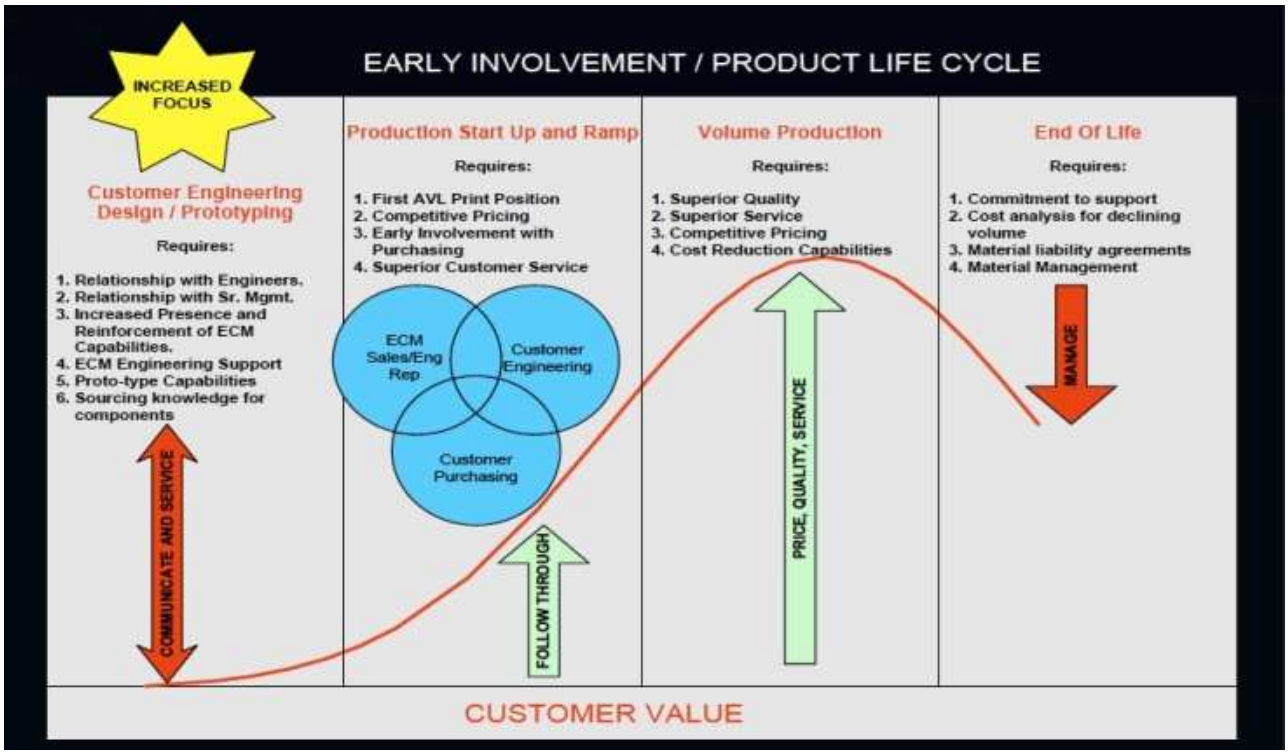
Mobile phones can be both disruptive (in terms of productivity and concentration levels) and dangerous (from a health and safety point of view). Mobile phone use in the workplace can also risk breaches of confidentiality. Policy is linked with the Company's Health and Safety Policy. Employer, have a duty to ensure that the working environment is safe and that safe policies and practices are adopted. Policy will apply differently to individual members of staff and what is acceptable will depend on the type of work being undertaken and the working environment. We expect all employees to adopt a common-sense approach in this regard.

It is against the law to use a hand-held mobile phone when driving. Employees are strictly prohibited from using a hand-held mobile phone at any time when driving. If an employee is caught by the police using a hand-held mobile phone or similar device whilst driving the individual can expect to get an automatic fixed penalty notice.

Life cycle of electronics products

The UPC code, now nearly universal on retail products, has provided a foundation for efficient product supply chains. The extension of a universal product code to the product lifecycle is could make reuse and recycling more efficient, economical,

and could open up new technological possibilities for product lifecycle management. The key questions concern the costs and environmental and economic benefits of extending the
UPC throughout the product lifecycle.



Introduction Stage The introduction stage in the part life cycle is usually characterized by high production costs driven by recently incurred design costs and low yield, frequent modifications, low or unpredictable production volumes, and lack of specialized production equipment. Marketing costs, at this stage, may also be high. Early adopter customers who buy a part in its introductory stage tend to value performance over price.

Growth Stage The growth stage is characterized by the part's market acceptance. Increased sales during this stage may justify the development and use of specialized equipment for production, which in turn improves economies of scale of production. Mass production, mass distribution, and mass marketing often bring about price reductions. This stage often consists of the largest number of competitors, as opportunity seeking firms are attracted by the part's profit potential and, strategic acquisitions and mergers have not yet taken place

Maturity Stage The maturity stage of the part life cycle is characterized by high-volume sales. Competitors with lower cost of production may enter the market, or domestic competitors may shift production facilities to less expensive locations to enable them to lower manufacturing costs. The 16M DRAM is an example of a mature part.

Decline Stage The decline stage is characterized by decreasing demand and generally decreasing profit margin. Towards the end of the decline stage, only a few specialized manufacturers remain in the market. TTL logic ICs are examples of parts that have been available very late in this stage due to continued sales in the black and white television market.

Phase-out Stage Phase-out occurs when the manufacturer sets a date when production of the part will stop. Generally, the manufacturer issues a discontinuance notice to customers, provides a last-time buy date, and suggests alternative parts or aftermarket manufacturers. As an example, on September 2, 1999 Texas Instruments (TI), Standard Linear and Logic Group announced the discontinuance of ULN2803A, a Darlington Transistor Array. TI stated that the product would be discontinued on September 2, 2000 with the last (and non-cancelable) order date being March 2, 2000.

Discontinuance and Obsolescence Discontinuance occurs when the manufacturer stops production of the part. The part may still be available in the market if the production line or part stocks were bought by an aftermarket source. [4]

End life cycle of electronics products

"End-of-life" (EOL) is a term used with respect to a product supplied to customers, indicating that the product is in the end of its useful life (from the vendor's point of view), and a vendor stops marketing, selling, or rework sustaining it. (The vendor may simply intend to limit or end support for the product.) In the specific case of product sales, a vendor may employ the more specific term "end-of-sale" (EOS). The time-frame after the last production date depends on the product and relates to the expected product lifetime from a customer's point of view. Different lifetime examples include toys from fast food chains (weeks or months), mobile phones (3 years) and cars (10 years).

Foreign countries best practices of E waste practices

In Switzerland, the first electronic waste recycling system was implemented in 1991, beginning with collection of old refrigerators.

Over the years, all other electric and electronic devices were gradually been included in the system. Legislation followed in 1998, and since January 2005 it has been possible to return all electronic waste to the sales points and other collection points free of charge. There are two established producer responsibility organizations:

SWICO, mainly handling information, communication, and organization technology, and SENS, responsible for electrical appliances. The total amount of recycled electronic waste exceeds 10 kg per capita per year.

Europe In 1998, the amount of electrical and electronic equipment arising (EEE) as waste was estimated for the EU15 at 6 million tons. The new estimate of the current WEEE arising across the EU27 is between 8.3 and 9.1 million tons per year for 2005. This increase is due to the expansion of the EU, growth in the number of households and inclusion of items that may have been excluded previously (B2B). A number of forecasting assumptions were applied which predict that by 2020, total WEEE arising will grow annually between 2.5% and 2.7% reaching about 12.3 million tons. At present each EU citizen produces 17-20 kg of e-waste every year. Of this some 90% is still land filled, incinerated, or recovered without any pre-treatment (Savage, 2006). The current amounts of WEEE in the EU are roughly between 25% for medium sized appliances to 40% for larger appliances.

According to a study conducted by the UNU in 2007, the returns of appliances lighter than 1kg are very low for all systems. In addition, the composition of EEE put on the market currently is different from that of WEEE arising due to changing product composition over time.

This is especially the case for flat panel displays instead of CRT screens as well as the phase out of CFC's from refrigerators, Nickel Cadmium from battery packs and Polychlorinated biphenyls in capacitors

Japan The amount of e-waste generation has seen a continuous rise in Japan since the 1990s. The domestic production of the electrical and electronic industries (including electrical equipment, electronic equipment, communications equipment, controls equipment, electrical measuring instruments, light fixtures, storage/ dry batteries, wiring equipment, electric bulbs, etc.) as of the year 2006 showed an increase of 105.8% as against 2005 (JEMA, 2007) . For computers specifically, the total number of disused computers in 1995 was estimated at 30,000 tons.

This number is predicted to increase to 100,000 tons by 2010 (METI, 2006). According to Japanese government sources, as much as 450 million tons (t) of waste is generated every year in Japan, of which 50 million t is municipal solid waste (MSW). At the same time, the number of final disposal sites is rapidly dwindling in the country. It is estimated that general waste landfill sites will be full within 10 years and that industrial landfill will be full by 2007/8 (DTI, 2005).

World e waste generation of Telecommunication equipment and India

As Indians become richer and spend more electronic items and appliances, Computer equipment accounts for almost 70% of e-waste material followed by telecommunication equipment (12%), electrical equipment (8%) and medical equipment (7%). Other equipment, including household e-crap account for the remaining 4%, it said.

The sad part is that a mere 1.5% of India's total e-waste gets recycled due to poor infrastructure, legislation and framework which lead to a waste of diminishing natural resources, irreparable damage of environment and health of the people working in industry. Over 95% of e-waste generated is managed by the unorganised sector and scrap dealers in this market, dismantle the disposed products instead of recycling it

In India, about 4-5 lakhs child labours between the age group of 10-15 are observed to be engaged in various e-waste (electronic waste) activities, without adequate protection and safeguards in various yards and recycling workshops, said Mr. D S Rawat, Secretary General ASSOCHAM while releasing the paper. The chamber has also strongly advocated the need to bring out effective legislation to prevent entry of child labour into its collection, segregation and distribution, reveals the study.

"E-waste typically includes discarded computer monitors, motherboards, Cathode Ray Tubes (CRT), Printed Circuit Board (PCB), mobile phones and chargers, compact discs, headphones, white goods such as Liquid Crystal Displays (LCD)/ Plasma televisions, air conditioners, refrigerators and so on.

As per the study, E-waste workers in India suffer from breathing problems, such as asthma and bronchitis. Many workers are children, who are unaware of the hazards and by the time they reach 35 to 40 years of age, they're incapable of working, points out the study.

About 2/3 of e-waste workers in India suffering from respiratory ailments like breathing difficulties, irritation, coughing, choking, tremors problems who all are engaged in various e-waste (electronic waste) activities due to improper safeguards and dismantling workshops.

The recovery of metals like gold, platinum, copper and lead uses caustic soda and concentrated acids. The workers dip their hands in poisonous chemicals for long hours. They are also exposed to fumes of highly concentrated acid. Safety gear such as gloves, face masks and ventilation fans are virtually unheard of, noted study.

According to the study, computers, televisions and mobile phones are most dangerous because they have high levels of lead, mercury and cadmium -- and they have short life-spans so are discarded more, adds the study.

The main sources of electronic waste in India are the government, public and private (industrial) sectors, which account for almost 75% of total waste generation. The contribution of individual households is relatively small at about 16 per cent; the rest being contributed by manufacturers. Though individual households are not large contributors to waste generated by computers, they consume large quantities of consumer durables and are, therefore, potential creators of waste, reveals the ASSOCHAM study.

E-waste accounts for approximately 40 percent of the lead and 70 percent of heavy metals found in landfills. These pollutants lead to ground water and air pollution and soil acidification. High and prolonged exposure to these chemicals/ pollutants emitted during unsafe e-waste recycling leads to damage of nervous systems, blood systems, kidneys and brain development, respiratory disorders, skin disorders, bronchitis, lung cancer, heart, liver, and spleen damage.

Despite the Indian government stringent law to regulate e-waste trade, destitute children still face hazards picking apart old computers, TV etc. The chamber has also strongly advocated the need to bring out effective legislation to prevent entry of child labour into its collection, segregation and distribution. [5]

Gaps between forging countries Vs India

For two decades the global narrative around electronic waste has typically been that rich, industrialized countries were dumping used devices onto impoverished ones, where the desperately poor often recycled printed circuit boards under unsafe conditions. But experts say nascent e-waste trends are beginning to challenge that paradigm. Developing countries are now shipping more e-waste by weight to developed countries than vice versa, according to a recent analysis of United Nations trade data by Josh Lepawsky, a geographer at Canada's Memorial University of Newfoundland and an expert on the electronic waste trade. "

For example, the German government's development aid agency, the German Society for International Cooperation, has supported an Indian company named e-WaRDD that has piloted a project to incentivize circuit-board collection in Bangalore, India. And a Belgium-based non-profit, World Loop, receives corporate funding to support a range of electronics recycling programs in Africa that link informal recyclers with state-of-the-art facilities overseas that recycle printed circuit boards, transformers, and leaded glass.

Researchers say printed circuit boards, which often contain gold and other valuable metals, are a good first step for such projects because they typically represent the most valuable — as well as the most environmentally hazardous — aspect of the e-waste recycling process. The goal is to allow collectors to continue their practice of re-using or manually dismantling electronic equipment, but then sell those parts to professional facilities instead of melting them or using cyanide to extract

valuable metals in backyard workshops. Advanced recycling facilities employ commodity separation, shredding, resource recovery, and pollution-control technologies that greatly reduce the health and environmental hazards associated with backyard recycling operations.

As e-waste flows shift, manufacturers in China, India, and many other low- and middle-income countries increasingly view e-scrap as a valuable commodity — both for extracting metals and for manufacturing new devices from a product's component parts. That is partly because the value of e-waste has broadly increased in recent years in tandem with rising demand for the so-called "rare earth" elements used in laptops, cellular phones, and other electronic devices.

India is planning to burn more of its trash to generate badly needed electricity. But critics are worried about lax air pollution controls and the impact of incineration on people who eke out a living picking through trash. [6]

References

1. Qualcomm® GobiTM is a product of Qualcomm Technologies, Inc. (https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=1&cad=rja&uact=8&ved=0ahUKEwjFlJPdv_nTAhUIpo8KHcrdAGoQFggmMAA&url=https%3A%2F%2Fwww.qualcomm.com%2Fmedia%2Fdocuments%2Ffiles%2Fthe-evolution-of-mobile-technologies-1g-to-2g-to-3g-to-4g-lte.pdf&usg=AFQjCNG3qRXMoge4VOZXaWLU9NQ649Ib9g&sig2=bg5DjN3x_ww1cS8rP-aNSw)
2. http://www.electroschematics.com/5231/mobile-phone-how-it-works/
3. https://www.ibef.org/industry/telecommunications.aspx
4. http://enme.umd.edu/ESCML/Papers/ObsCPMT.pdf
5. http://www.assocham.org/newsdetail.php?id=5725
6. http://e360.yale.edu/features/in_developing_world_a_push_to_bring_e-waste_out_of_shadows

Twelve Golden Sentences

1. Heavy rains remind us of challenges in life. Never ask for a lighter rain, just pray for a better umbrella. That is Attitude.
2. When flood comes, fish eats ants and when flood recedes, ants eat fish. Only time matters. Just hold on. God gives opportunity to every one.
3. In a theatre when drama plays, you opt for front seats. When film is screened, you opt for rear seats. Your position in life is only relative. Not absolute.
4. For making soap, oil is required. But to clean oil, soap is required. This is the irony of life.
5. Life is not about finding the right person. But creating the right relationship.
6. It's not how we care in the beginning. But how much we care till the end.
7. Every problem has (N+1) solutions: where N is the number of solutions that you have tried and 1 is that you have not tried.
8. When you are in problem, don't think it's the End. It is only a Bend in life.
9. Difference between Man and God is God gives, gives and forgives. Man gets, gets and forgets.
10. Only two category of people are happy in life-The Mad and the Child. Be Mad to achieve a goal. Be a Child to enjoy what you achieved.
11. Never play with the feelings of others. You may win. But loose the person for lifetime.
12. There is NO Escalator to success. ONLY STEPS!!!