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VOICE & DATA

Connecting the Digital World

CyberMedia

FOR A MULTI LINGUAL INTERNET

Universal Acceptance is the key requirement — one in which users can navigate in their regional / local language.

One of the main objectives of the next phase of Digital Government is multi lingual access at every point where there is a government presence on the Internet.

Rajeev Chandrasekhar
Union Minister of State for Electronics and Information Technology and Union Minister of State for Skill Development and Entrepreneurship

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OUR OFFICES
GURGAON (CORPORATE OFFICE)
Cyber House
B-35 Sector-32, Gurgaon, Haryana – 122 001
Tel: 0124 - 4822222 Fax: 0124 - 2380694

BENGALURU
205-207, Sree Complex (Opposite RBANMS Ground)
73, St John's Road, Bangalore – 560 042
Tel: +91 (80) 4341 2000, Fax: +91 (80) 2350 7971

MUMBAI
404 Trade Square, Mehra Industries, Compound Safed Pool,
Sakinaka, Andheri East, Mumbai – 400072
Mobile: 9969424024

INTERNATIONAL
Huson International Media
President, 1999, South Bascom Avenue, Suit 1000,
Campbell, CA95008, USA
Tel: +1-408-879 6666, Fax: +1-408-879 6669

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For Subscription queries contact rsevoicendata@cybermedia.co.in

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GAJENDRA
UPADHYAY

[OPENING NOTE]

WE ARE CREATING THE NEXT PHASE OF DIGITAL GOVERNMENT - RAJEEV CHANDRASEKHAR TELLS V&D

Our cover story this month focuses on the core technical, policy and global initiatives around making access to the Internet in every language an imperative and important milestone to achieve.

There are many initiatives on this, including several from ICANN, the global policy body that manages the Internet. Ajay Data the Chairperson of the committee on Universal Acceptance at ICANN has a very thought provoking and informative take on this entire issue.

The Indian Government is working on multiple fronts to make this a reality.

In an exclusive chat with Voice & Data, Union Minister of State for Electronics & IT, Shri Rajeev Chandrasekhar was very eloquent on the issue and outlined the main areas that require to be worked on.

"MultiLingual Internet is all about ensuring universal access to the Internet," the Minister said.

"Today 80 crore Indians are using the Internet and that number will be 120 crore by 2025. Language is an issue for a large number of Indians using the Internet at the search engine level, at the browser level and at the app level plus also for emails. These are issues that are creating an unintended consequence of exclusion from the Internet," he told me.

"While people are connected to the Internet and using Internet for Youtube etc, the true power of the Internet is not available in the hands of a large number of users, because of the exclusionary nature of English.

"It is therefore an important policy objective for us to ensure that 130 crore Indians are able to use the search engines, browsers email etc in multiple languages. And all other functionalities. There is a task force that is working on it. While we are parallelly working on the Bhashini language translation platform for creating applications and addressing issues of language layers for accessing the Internet, this is a work in progress. And we are hoping to achieve this soon – but it is clearly one of our policy objectives,"

The Minister was well aware and seemed updated with all the ground issues around the Language Internet and also had a roadmap for this.

"The core issue is whether the government websites, Internet signatures are user friendly and have a common language and UX interface. Towards making this happen, we are creating the next phase of Digital Government. One of the main objectives of the next phase of Digital Government is multi lingual access at every point where there is a government presence on the Internet."

gajendrau@cybermedia.co.in

Universal Acceptance – The bedrock for enabling a multi lingual Internet globally

Thereare 7,000 languages and dialects used across the globe. In India we have 22 scheduled languages

BY MAHESH D. KULKARNI

Universal Acceptance is a foundational requirement for a truly multilingual Internet, one in which users around the world can navigate entirely in local languages. It is also the key to unlocking the potential of new generic top-level domains (gTLDs) to foster competition, consumer choice and innovation in the domain name industry. In order to promote UA, Universal Acceptance Steering Group (UASG) - A community-led initiative was founded in February 2015 by ICANN.

- Tasked with undertaking activities to promote the Universal Acceptance of all valid Domain Names and email addresses.
- Members from more than 120 companies (incl. Apple, GoDaddy, Google, Microsoft, and Verisign), governments, and community groups.

Multilingual Internet, from a common man perspective may be defined as.

A set of tools / services by which one can easily create, communicate, transact, process and retrieve information with ease in digital medium without language barrier.

The Internet has become all pervasive and has become a part and parcel of our lives. We all have witnessed the power of the internet more specifically in the pandemic, which helped us to stay connected as well as do business as usual. As of Jan 2021, the global active internet user stands at 4.66 billion while 90-95% consumption of internet is from social networking usage alone.

The convergence of AI (Artificial Intelligence) and IoT has redefined the way industries, business, and

> Machine translation systems, natural language processing, natural language generation and many more are now growing part of our lives and help dissolving language barriers.

economy's function. Speech to speech technologies, facial recognition, virtual assistants, Machine translation systems, natural language processing, natural language generation and many more are now growing part of our lives and help dissolving language barriers.

50 billion devices expected to get connected in 2022, within 50 years we will have the technology for embedding internet transceivers into human brains, and that by 2069 the brain-machine interface will be fully developed, wherein the internet ecosystem will be catalytic to human advancement. The residential internet speeds will be touching 10 gigabits per second – 10 times faster than today's networks.

Multilingualism becomes an extremely crucial aspect to bring the next one billion users on the network. There are 7,000 languages and dialects used across the globe. In India we have 22 scheduled languages, and we have one to many and many to many relationships between the scripts and languages.

As an example, Devanagari script alone covers 10 scheduled languages, such as Boro (Bodo), Dogri, Konkani, Hindi, Maithili, Marathi, Nepali, Santali, Sanskrit, Sindhi while Sindhi is written in Devanagari as well as Perso-Arabic script

The diversification is well defined by Hindi phrase
कोस-कोस पर पानी बदले, चार कोस पर वाणी|

The next billion Internet users will likely come from non-English speaking countries, providing access for these users will require more than supporting internationalized or multilingual content. Localized domain names and email addresses are required.

Consumption as well as creation of multilingual contents is also on rise, which is a boon to advancements in human inspiring systems. The advancement in Machine Learning has led to remarkable progress in Natural Language Processing (NLP), the field of Artificial Intelligence that gives computers the ability to understand human language.

Since the inception of the Internet, Domain Names were available only in Latin characters and having Domain Names in one's language was a distant dream. But, today with the initiative of ICANN, having Domain Names in any script / language of the world has become reality.

The Internet landscape has changed dramatically over the last decade with the expansion and evolution of available Top-Level Domains (TLDs), generic Top-Level Domains (gTLDs), the Internationalized Domain Names and Email Address Internationalization (EAI).

Since 2010, the industry has seen the introduction of IDNs which are based on different languages and scripts. Over 1,200 greater varieties of new generic Top-Level Domains (new gTLDs) got registered. Email Address Internationalization (EAI) also started appearing on the scene. The gTLDs consisted of New short Top-Level Domain Names as well as Long Top-Level Domain Names which removed the restriction of 3 characters at TLD level.

Though the Internet and Domain Name System (DNS) have transformed, many websites and applications have not kept themselves up with the changes. Many systems still cannot process all Domain Names or email addresses and more specifically the Internationalized Domain and Email Address Internationalization and have not realized that the growth of Internet users is dependent on this.

The Universal Acceptance (UA) initiative of Universal Acceptance Steering Group (UASG) of ICANN addresses this issue and the solutions are already available from the industry and for different technological platforms. However, everyone in the chain needs to be UA ready to achieve a truly Multilingual and inclusive Internet.

To support the new Top-Level Domains and Email Addresses, Applications and Systems must be capable of fundamental five actions: Accept, Validate, Store, Process and Display. Software and online services support Universal Acceptance when they offer the five actions listed above for all Domains and email Names.

A new horizon has opened up with the possibility to have Internationalized Domain Names in one's mother-tongues and scripts. ICANN has opened up having gTLD's other than those previously eight viz., .com, .org, .net, .int, .edu, .gov, and .mil, .arpa which were created in the

1980s. Today one can have a gTLD with the name of an organization or even the name of a city such as .delhi or an institution such as .iitmumbai. These changes have opened up new vistas and exciting possibilities and at the same time technological challenges as well as legal and security issues.

THE NEED

Though 65 percent of the world's population is connected to the Internet, 92 percent of the web pages are published only in 12 languages. Also, 60 percent of Internet publications are in the English language alone. It is interesting to note that there are 7,000 languages and dialects used across the globe and the next billion Internet users will likely come from non-English speaking countries. Hence there is a need for technological shift to bring this next billion plus users online.

Many of the next billion Internet users are not online because systems that enable their access do not support their language. India being a multilingual country and 92 percent of population is non-English, for want of proper support / availability of tools / technologies, 50 percent of India's population is yet not online. Providing access to the internet for these users will require technological solutions apart from merely Internationalized or multilingual content. Localized Domain names and email addresses need to be part of these technological solutions.

Popular web platforms and applications are increasing support for multilingualism.

- Total 481 million internet users with 295 million – Urban and 186 million rural
- Out of 892 million potential new users – 160 million urban
- Potential new users in rural India – 732 million
- If language enabled 205 million will join
  - Facebook supports more than 110 languages (compared with 100 languages last year) and is actively increasing the languages that it supports,
  - Google Translate is available for more than 100 languages,
  - Twitter supports 34 languages.
  - The world's most popular apps are also increasing the number of supported languages: Whatsapp is available in up to 60 languages, Instagram in 35 languages.

As a result of our analysis of the language of content associated with IDNs, we can state that:

- IDNs help to enhance linguistic diversity in cyberspace
- The IDN market is more balanced in favour of emerging economies
- IDNs are accurate predictors of the language of web content.

BENEFITS

The Top-Level and Internationalized Domains have evolved and matured enough as far as the technology is concerned. For increasing business reach and greater opportunities, the UA for applications, services are crucial. People are generally comfortable in trusting and communicating in their local language. Having a local language identity (i.e., email address) is easier to use for the non-English speaking user for participating in any government, social, banking and other online applications. UA allows customers to expand their customer base by offering products / technologies / services to various countries in their own languages. Businesses can now communicate, share information, provide products, technologies and services in the customer's language, creating trust and build a huge business potential while bringing the next billion plus users online. Govt. services can also communicate with the user in their local language creating inclusiveness and better adoption.

NATIONAL SCENARIO

As of Jan 2022, there are 1488 active TLDs including 153 IDN TLDs (mostly ccTLDs), which includes India's 15 IDN ccTLDs, covering 22 Indian languages represented using 11 scripts (10 Unicode Code Charts).

NIXI has already started offering Indian language domain names in all 22 scheduled languages. .भारत (.bharat) IDN ccTLD (using Devanagari script) covers 8 languages Bodo (Boro), Dogri, Hindi, Konkani, Maithili, Marathi, Nepali, and Sindhi-Devanagari, while .ভারত IDN ccTLD covers 2 languages Bengali and Manipuri, also includes ccTLDs from RTL scripts viz. Urdu, Sindhi and Kashmiri. These domain names are being offered by accredited registrars and the user/registrant can register the Indian language domain names in his/her choice of language. Email in one's own language offerings are also on rise. The following table shows the IDN ccTLDs in the scripts mentioned and the languages supported. Annexure I include "List of scheduled Indian languages and major scripts used".

Application support - A study in 2017, carried out by Donuts and ICANN staff, looked at 749 of the Alexa top-1,000 websites and found that only 7% of the sites allowed users to use Internationalized Email Addresses in fields that require an email address to be filled in.

SECURITY CONSIDERATIONS IN INTERNATIONALISED DOMAIN NAMES

As the Internet has become a critical resource with constant security attacks and threats, the DNS has also been attacked and threatened. However, use of new protocol, developments and operational best practices have increased the resilience, stability and security of the DNS protocol and the global DNS infrastructure

SECURITY CONSIDERATIONS IN DOMAIN NAMES

Homograph / Homoglyphs

Visual illusion, already existed in ASCII Domain Names and was not originally introduced by IDN specifically. Visual illusion is created by using confusingly similar characters.

- Among ASCII characters, 1 (digit) and l (letter l) are similar-looking and so as 0 (digit) and O (letter O). These character pairs can be used for visual tricks.
- *vishwakosh.com* and *vishvvakosh.com* (later uses two consecutive "v" characters)
- *www.ICICI.com* & *www.lClCl.com* (latter make use of small L instead of "I") are also not addressed
- "*rnicrosoft.com*" looks much like "*microsoft.com*"

Homograph attacks, which are widely known, abuse homoglyphs to create lookalike URLs. Instead of going to a legitimate site, you may be directed to a malicious site, which could look identical to the real one. While, that combinations of similar-looking characters will increase when Internationalised Domain Names are used, the same can be mitigated with the IDNA 2003/2008 protocols.

CORRUPTION / MISSPELLINGS

Additionally, a spoofing attack can be made by corruption of a name. Adding extra labels after a well-known brand name, or including the brand name in the path of a URL labelled as secure, can confuse users, more specifically from rural areas, regardless of the use of the IDN.

However, it will be not possible to address corruption / misspellings domain as below:

pay-pal.com	nixi-support.in	color.com	localisation.in	हिंदी	इण्डिया
paypal-online.com	ni-xi.in	colour.com	localization.in	हिंदी	इण्डिया
paypal24.com	nixi123.in				

As is known, the Domain names may not be necessarily "meaningful", also, it is not possible to have 100% accurate rules / databases to handle different linguistic variations in any given language. The IDNA 2003 / 2008 protocols have not considered these variants as historically other domains have always considered alternate spellings of *www.color.com* and *www.colour.com* as separate entities

SINGLE SCRIPT CONFUSABLE:

Spoofing characters entirely within one script or using characters common across scripts (such as numbers).

Example

Confusable using Latin character set

- lOl.in (use of small L and capital O)
- 101.in (use of numerals)
- dze.in (uses basic Latin character set)
- e.in (uses Unicode Character "ʣ" (U+02A3) - Latin Small Letter Dz Digraph)

MIXED SCRIPT CONFUSABLE

Spoofing characters within more than one script and not a single script confusable.

Mix of Latin and Cyrillic

- paypal.in (use of Latin character set)
- paypal.in (use of a - U+0430 - CYRILLIC SMALL LETTER A)

Mix of Latin and Greek

- *top.in* (use of Latin character set)
- *top.in* (use of ο - U+03BF - GREEK SMALL LETTER OMICRON)

WHOLE SCRIPT CONFUSABLE

Mixed script confusable where each of the strings is entirely within one script.

Example:

- *caxap.in* (use of Latin character set)
- caxap.in (use of capax - U+0441U+0430U+0445U+0430U+0440 in Cyrillic)

BIDIRECTIONAL SPOOFING

Example:

- com .سلام. سلام//:http
- http:// دائم. a. سلام. com

SYNTAX SPOOFING

examples directing us to bad.com

- *http://example.com⁄x.bad.com* (beware of U+2044 Fraction Slash)
- *http://example.com?x.bad.com* (beware of missing fonts as question marks)

- *http://example.com*—long-and-obscure-list-ofcharacters.bad.com (this one already on the wild)

MITIGATING THE SECURITY THREATS

The ASCII Domain names has its own set of security threats imposed from the underlying layers of the technology itself, thus they are applied to IDNs. Though IDNs fulfil the multilingualism and inclusive internet, they impose additional set of security threats – mainly from linguistic characteristics of various languages as mentioned above.

The majority of the issues related to IDNs are from an application perspective (including security), and protocols. IDNs have their own set of unique security concerns imposed from linguistic characteristics of various language sets such as diacritics, variants, and digit mixing. IDNA protocol addresses these issues with broad goal of:

- Unicode-version agnostic
- Easier to understand
- More predictable when languages and scripts are applied and used.
- More adaptable to regional requirements

The protocols are devised mainly to include

1. Latest / current version(s) of Unicode
2. Permissible and valid character repositories
3. Transforming(mapping) a Unicode string to remove case and other variant differences
4. Checking the resulting string for validity, according to certain rules
5. Handling deviations
6. Considerations for Right to Left scripts
7. Transforming Unicode characters into Punycode for working with DNS
8. No script mixing – to minimize the confusability of character across various scripts
9. Language tables for permissible characters with a code block
10. Minimizing impact of transition from IDNA 2003 to IDNA 2008
11. What is allowed on which layer of IDN registrations

IDNA2008 protocol have been developed to resolve many – if not all – including of them Bidirectional Spoofing.

TWO IDNA STANDARDS

First version: named IDNA2003 (RFC3490)

- Algorithms named StringPrep(RFC3454) and NamePrep(RFC3491).
- Encoding in ascii uses Punycode (RFC3492).
- identifies an IDN by adding xn-- to the Punycode encoding of the domain

Was defined against Unicode 3.2 (March 2002)

Provisions to use new characters (i.e., added after Unicode 3.2) as is

Second (and latest) version: named IDNA2008.

- RFC 5890 IDNA: Definitions and Document Framework J. Klensin
- RFC 5891 IDNA: Protocol J. Klensin
- RFC 5892 The Unicode Code Points and IDNA P. Faltstrom
- RFC 5893 Right-to-Left Scripts for IDNA H. Alvestrand, C. Karp
- RFC 5894 IDNA: Background, Explanation, and Rationale J. Klensin

No more using Stringprep and Nameprep, however encoding in ascii still uses Punycode and the same prefix (xn--). IDNA2008 is much more agile to support new characters added by Unicode over time.

- IDNA2008 is more restrictive than IDNA2003: valid domains under IDNA2003 may not be valid under IDNA2008.
- Therefore, it is highly recommended to use the IDNA2008 standard.
- Recommendation: make sure the libraries you are using are based on IDNA2008.

To "facilitate" the transition from IDNA2003 to IDNA2008, Unicode defined a transitional feature in the UTS 46 specification. Under UTS 46, ß.example is mapped to ss.example. IETF does not recommend the use of UTS 46. ICANN supports only IDNA2008, therefore an IDNA2003 or a UTS46 transitional domain are not valid.

LABEL GENERATION RULESETS (LGRS)

Label Generation Rulesets (LGRs) specify metadata, code point repertoire, variant rules and Whole Label Evaluation (WLE) rules to generate labels

ROOT ZONE LABEL GENERATION RULES (LGR) PROCEDURE

Generation Panels

- Generate proposals for script specific LGRs, based on community expertise and linguistic, security and stability requirements

> There are many software applications issues that require special attention. For exampe, most DNS-resolving software – if not all – can resolve ASCII characters only. Thus, when deploying/updating domain name entries in zone files, they must be entered in their A-Label equivalent rather than their U-Label.

Integration Panel
- Integrates them into common Root Zone LGR while minimizing the risk to Root Zone as a shared resource

Label Generation Rules (LGR)
- Which labels are permissible
- Which variant labels exist
- Are there any more constraints?

LABEL GENERATION RULES

Root Zone Label Generation Rules (RZ-LGR) - provide a conservative mechanism to determine valid IDN TLDs and their variant labels, for stable and secure operation of the DNS Root Zone. Consists of Code point repertoire, Variants and Whole Label Evaluation Rules.RZ-LGR-4 currently integrates 18 scripts which includes Arabic, Devanagari, Gujarati, Gurmukhi, Kannada, Malayalam, Oriya, Tamil, Telugu

REFERENCE LABEL GENERATION RULES FOR THE DEVANAGARI SCRIPT:

This document specifies a reference set of Label Generation Rules (LGR) for the Devanagari script for the second level. The starting point for the development of this LGR can be found in the related Root Zone LGR [RZ-LGR-4-Deva].

https://www.icann.org/sites/default/files/packages/lgr/lgr-second-level-devanagari-script-15dec20-en.html

In the context of the above, there are many software applications issues that require special attention. Software applications that require attention include:

- **Browser applications**
  legacy web browsers – do not support IDNs
- **E-mail client and server applications**
  Not all email servers support EAI and very few can offer mail boxes in local languages
- **Suites of office productivity tools**
  Support of IDN hyperlinks linkification.

Web-based e-mail services, social networking services, blogging and online banking
Not all – of the above-mentioned services do not support IDNs.

Look-up tools and command prompts
Current look-up tools accept ASCII characters only. Various command prompts (such as cmd) accept ASCII characters only; if the language is changed, question marks '?' appear.

DNS registration
Most DNS-resolving software – if not all – can resolve ASCII characters only. Thus, when deploying/updating domain name entries in zone files, they must be entered in their A-Label equivalent rather than their U-Label.

Search engines behaviour and optimisation
- They play an important role in marketing, proper representing, and indexing IDNs.
- IDNs under the fear of low ranking their IDN website in the search results.

Software development kits (SDK) and mobile SDKs
- Mobile applications have become very popular. There are thousands of applications out of which many uses domain names in the background to fetch/manipulate data.

Web hosting solutions providers
- Examples include hosting automation applications (cPanel, Plesk). End-users' expectations for provisioning IDN hosting packages should be as simple as what it does with ASCII domain names.

SSL/digital certificate providers
- An IDN should be easily signed and be good enough for companies to use in e-commerce.

Mahesh D. Kulkarni is Founder CTO EVARIS SYSTEMS LLP and former, Sr. Director (Corporate R&D), CDAC and HoD GIST.
feedbackvnd@cybermedia.co.in

Giving Indians (भारत) what they truly deserve through Universal Acceptance

90% of our population does not use English as a primary language. If citizens are to use the power of Internet then all websites should be hosted on language IDN and must provide Email Address Internationalsation.

BY DR. AJAY DATA

The 7.5 billion population of the world embraces different cultures, geographies, religion and language. When it comes to Internet, language becomes much more important as approximately 350* (source Wikipedia-English-Speaking-world) million people speak English and most of Internet building blocks are in English – technically speaking it uses ASCII or the American Standard Code for Information Interchange the most common character encoding format for text data in computers and on the internet.

The complexity in India with 1.3 billion people is much more as India officially uses 22 languages and no true, universal, national language.

While recognising this need of multi-lingual Internet and bridging the digital divide in between English and non-English population so that non-English population can be upgraded to use the power of Internet.

ICANN along with passionate community individuals

> While recognising this need of multi-lingual Internet and bridging the digital divide in between English and non-English population so that non-English population can be upgraded to use the power of Internet.

in 1996 starting talking about this and IDN (Internationalized Domain Name) took birth.

WHAT IS IDN?

An internationalized domain name (IDN) is an Internet domain name that contains at least one label that is displayed in software applications, in whole or in part, in a language-specific script or alphabet, such as Arabic, Chinese, Cyrillic, Tamil, Hindi or the Latin alphabet-based characters with diacritics or ligatures, such as French. These writing systems are encoded by computers in multi-byte Unicode. Internationalized domain names are stored in the Domain Name System as ASCII strings using Punycode transcription. पत्रकिा.भारत in Hindi , почта. рус in Cyrillic and 支持@电邮.在线 in Chinese are valid examples of Internalized Domain names.

IDN adoption started from year 2010 with ccTLDs in the Arabic alphabet for Egypt, Saudi Arabia and the United Arab Emirates. India adopted IDN in 2014 with .भारत (Hindi equivalent of India) and launched domain registration in 8 Indian languages.

WHAT IS PUNYCODE?

Punycode is a way to represent Unicode within the limited character subset of ASCII used for Internet host names. Using Punycode, host names containing Unicode characters are transcoded to a subset of ASCII consisting of letters, digits, and hyphen (the Letter-Digit-Hyphen (LDH) subset, as it is called). So when a IDN domain gets configured in DNS system, the domain name is configured using punycode not in Unicode part of domain. To explain it better we can take an example of Hindi IDN पत्रिका.भारत and its punycode will be xn--11b3arz5ee0h.xn—h2brj9c. You can try hands on using *https://eai.xgenplus.com* to convert any Unicode to Punycode or Punycode to Unicode.

As we all know, domain names are primarily used for two critical applications, 1) Website and 2) Email. Email was very important part for better adoption of the IDNs hence EAI (Email Address Internalization) protocol was finalised. and in 2014 Google announced their gmail platform to be compatible with email address created on IDNs.

WHAT IS EAI?

EAI is the protocol that allows email addresses with IDNs in the domain part and/or Unicode (non-ASCII) characters in the Mailbox name to function within the traditional email environment. संपर्क@डाटामेल.भारत is a valid example of valid email address in Hindi. More information about EAI can also be found on https://uasg.tech . The IETF conducts a technical and standards working group devoted to internationalization issues of email addresses, entitled Email Address Internationalization (EAI, also known as IMA, Internationalized Mail Address). IETC has produced RFC 6530, RFC 6531, RFC 6532, and RFC 6533, and continues to work on additional EAI-related RFCs. In general communication people also refer this as Internationalization (UTF8SMTP) extension to email servers.

Obviously, now its understood that RFCs were needed to be followed by email servers and email clients (MUA) to be able to start EAI and this would create a situation where EAI Compliant email servers and non-EAI compliant servers will co-exists in the email world. This created a challenge to deliver an EAI email to non-EAI compliant email server and this led to another innovation and protocol called Downgrading. So tht both servers can communicate and exchange emails flawlessly.

WHAT IS DOWNGRADING?

Internationalization (UTF8SMTP) extension allows UTF-8 characters in SMTP envelope and mail header fields. To avoid rejecting internationalized Email messages when a server in the delivery path does not support the UTF8SMTP extension, some sort of converting mechanism is required. This is known as Downgrading mechanism for Email Address Internationalization.

So when EAI compliant tries to deliver an email containing Unicode envelope and recipient server do not announce UTF8SMTP support, the sender server MUST downgrade

> To solve this problem along with other domain names issue, In 2015, a volunteering group got formed under ICANN umbrella known as Universal Acceptance Steering Group

and change the envelope to punnycode (contains only ASCII characters) so that email gets delivered without any problem. However reciepient will not be able to display original Unicode characters. For Example email address in Hind अजय@डाटा.भारत should be automatically downgraded to xn--l1b0cxc@xn--c2bd1gb.xn--h2brj9c if an email is being delivered to non-eai compliant email server.

Companies also trying to innovate and replace the Punycode to a normal ASCII email address so that recipient can understand the sender very well and do not get confused by seeing punycodes.

UPGRADING PEOPLE: (BRIDGING THE DIGITAL DIVIDE)

In the times to come, our large global population will have access to internet as we all do today. People who are deprived because of language barrier, will enjoy the power of internet without any further laminations. We can imagine that IDN+EAI+Downgrading are going to create massive impact on the entire internet infrastructure, its adoption at mass scale and impacting billions of people life positively.

UNIVERSAL ACCEPTANCE

While its a a matter of fact that any one can have IDN (A Domain Name in any language ie. डाटा.भारत), EAI (A Email address in any language अजय@डाटा.भारत) but acceptance of them in softwares and websites is still a challange. More than 80% of email servers are not capable to communicate with EAI address. While Google and Microsoft supports communication with EAI addresses, but more solutions do not support that communication.

To solve this problem along with other domain names issue, In 2015, a volunteering group got formed under ICANN umbrella known as Universal Acceptance Steering Group *(https://www.uasg.tech)* which a clear mission ie. All domain names and email address must be accepted in all software application.

The mission could sound simple, but there are huge challanges which this group is trying to solve with 650+ volunteers across the world. For example one can not signup on facebook with EAI address or open a bank account or use this email address for AADHAR. These are just examples to explain the problem, there are much more problems. UASG is trying to solve the problem via measurement, remediation and awareness efforts.

If software can ACCEPT, VALIDATE, PROCESS, STORE, and DISPLAY any domain name and email address the way it should, the software could be considered UA ready.

WHY IT IS IMPORTANT FOR INDIA

Our 90% population do not use English as primary language. If citizens have to use the power of internet and Govt has to enable the door of communication with citizens than all the websites should have hosted on IDN and must provide EAI address. Citizens should be able to do everything in India with their preferred email address such as my email address अजय@डाटा.भारत. Once we enable a citizen with barrier free access to information / internet we can expect many more revolutions in India.

ABOUT ICANN

ICANN's mission is to help ensure a stable, secure and unified global Internet. To reach another person on the Internet, you have to type an address into your computer - a name or a number. That address has to be unique so computers know where to find each other. ICANN helps coordinate and support these unique identifiers across the world. ICANN was formed in 1998 as a not-for-profit public-benefit corporation and a community with participants from all over the world. ICANN and its community help keep the Internet secure, stable and interoperable. It also promotes competition and develops policy for the top-level of the Internet's naming system and facilitates the use of other unique Internet identifiers.

Dr. Ajay Data is founder & CEO of Data Xgen Technologies.
feedbackvnd@cybermedia.co.in

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Internet at a crossroads? The risk of fragmentation is real

At its most basic, Internet fragmentation means that the Internet could break apart into separate intranets, resulting in a splintering of the unified Internet

BY JIA-RONG LOW

In recent years, political and for-profit motivations have resulted in steps taken that could undermine the interoperability of the global Internet, potentially leading to what experts call Internet fragmentation.

Indian business and foreign policy leaders are painting an increasingly gloomy geopolitical and economic picture.

Two out of three CEOs in India expect a recession in the next 12 months, according to the recently published KPMG 2022 India CEO Outlook.

Among other factors, geopolitical turmoil, such as the Russia-Ukraine war, has a negative impact on business sentiment.

With geopolitical uncertainties continuing to impact strategies, 75 percent of CEOs in India are adjusting or planning to adjust their risk management procedure, said the report by consulting firm KPMG.

The somber sentiment expressed by top executives in India was echoed by the country's finance minister. "The geopolitical environment remains tense and uncertain," said Nirmal Sitharaman at a recent IMF and World Bank meeting. She added that this "could trigger fresh supply concerns in the winter for critical commodities such as crude oil and natural gas. Inflation control would be a major concern in the developed economies."

But it is not just the business and financial sectors that face geopolitical uncertainties. In the Internet space, we are seeing a similar situation where individual decisions taken by various actors could potentially lead to the Internet's fragmentation. Continued global strife and division would make that risk increasingly real.

WHAT IS INTERNET FRAGMENTATION?

At its most basic, Internet fragmentation means that the Internet could break apart into separate intranets, resulting in a splintering of the unified,

Governments can help by directing their stakeholders to participate in the development of the Internet's standards and policies. Companies can contribute, by speeding up the adoption of the latest standards that will make it safer for users to access the Internet.

global, interoperable Internet we have come to rely on. A fragmented Internet would threaten the current Internet's core function and unprecedented capability of connecting users and their devices seamlessly, safely, and instantly anywhere in the world.

This means that users may no longer be able to connect with their friends and family anywhere in the world. The Internet also serves as vital tool for education, as information on the Internet is free; but we will lose this quickly when the Internet fragments.

MEASURES IMPACTING INTERNET OPERATIONS

In recent years, to respond to perceived data privacy concerns of their citizens, some governments have introduced new rules and regulations that unintentionally impacted the technical operation of the Internet. Others, driven by their perceived duty to shield citizens from what they deem as harmful information, have blocked access to certain content or large parts of the global Internet. According to the 2021 Freedom on the Net project, officials in at least 20 countries suspended Internet access, while 21 countries blocked access to social media platforms.

Against the backdrop of the Russian invasion, Ukraine had asked the Internet Corporation for Assigned Names and Numbers (ICANN) to target Russia's access to the Internet, by revoking specific country-code top-level domains operated from within Russia, arranging the revocation of secure sockets layer certificates issued within those domains, and shutting down a subset of root servers located in Russia.

KEEPING THE INTERNET WORKING

But organizations such as ICANN were established to ensure that the Internet works, not for its coordination role to be used to stop it from working. In ICANN's role as the technical coordinator of unique identifiers for the Internet, we take actions to ensure that the workings of the Internet are not politicized, and we have no sanction-levying authority.

Along with other organizations such as the Internet Engineering Task Force (IETF), ICANN sets technical policies and standards to keep the Internet working and evolving. For example, the IETF has set thousands of standards that have kept the Internet evolving to keep up with the times, such as developing the Internet Protocol version 6 (IPv6) address when it was discovered that IPv4 addresses were not sufficient to provide a distinct address to every Internet device.

Such standard-setting organizations are not motivated by politics or profit, but by a shared desire to keep the Internet working in a single and interoperable way. These organizations welcome anyone interested to participate and every voice is equal and heard.

STAYING INFORMED AND SPEAKING UP

Participating in the work of organizations like ICANN and the IETF will keep you informed about how the Internet works, as well as the current issues that are impacting it. It also enables you to help shape the future of the Internet. For example, at the recent ICANN75 meeting in Kuala Lumpur, Internet fragmentation was discussed.

Governments can help by directing their stakeholders to participate in the development of the Internet's standards and policies. Companies can contribute, by speeding up the adoption of the latest standards that will make it safer for users to access the Internet.

A good place to learn more about Internet governance is the ICANN website where you can find a plethora of information about Internet governance and ICANN. For a live and interactive deep dive into Internet governance consider attending one of our three annual meetings, either virtually or in person. It's free and open to everyone interested in ICANN and Internet governance.

We can all help to protect the global Internet so that the two billion people that remain unconnected can also enjoy its benefits– because that is what the Internet was intended to do: connect us.

Jia-Rong Low is Regional Vice President and Managing Director at ICANN Asia Pacific.
feedbackvnd@cybermedia.co.in

ONDC – Open Network for Digital Commerce

Aims to disrupt the Platform E-commerce model and bring in inclusiveness for the small traders in India and globally

BY THAMPY KOSHY

The Open Network for Digital Commerce (ONDC) is a path breaking, first-of-its-kind initiative globally that aims to democratize e-commerce – starting with India and then the rest of the world. This has been lauded as the UPI moment for e-commerce and has a larger vision for scale and inclusion for the small traders, kirana stores and entrepreneurs of our country.

In this short backgrounder Mr Koshy writes for Voice&Data explaining the core focus of the Open Network for Digital Commerce (ONDC), its main objective and what it will achieve for our country.

ONDC has been established as a not-for-profit company with the ambition to democratise and fundamentally revolutionise how digital commerce is

> ONDC has launched alpha in 80+ cities across India and beta launched in Bengaluru with other cities in the pipeline to launch over the upcoming weeks.

conducted in the country. This construct is different from the platform model, where all the various functionalities are vertically integrated within a centralised entity - to a decentralised format where different functions involved in an end-to-end e-commerce transaction can be performed by different entities.

In this decentralised model, buyers and sellers are at either end of the value chain, and network participants (buyer apps, seller apps integrated with ONDC) provide them with buyer and seller platforms to integrate with the network. The ONDC network enables communication across these buyer and seller apps through a gateway ensuring that all buyers interfacing with an ONDC-enabled buyer app will be able to access all the sellers (and their products) across all ONDC-enabled seller apps and vice versa.

For example, if you are trying to buy a bar of soap online, today you are either restricted to sellers who are integrated with the platform you are buying online from, or have to physically go to the local store you are acquainted with.

With ONDC, you will be able to see the entire universe of sellers that are selling soap irrespective of the platform they are integrated with. This universe of sellers could also include your local store, who will find it easier to come online.

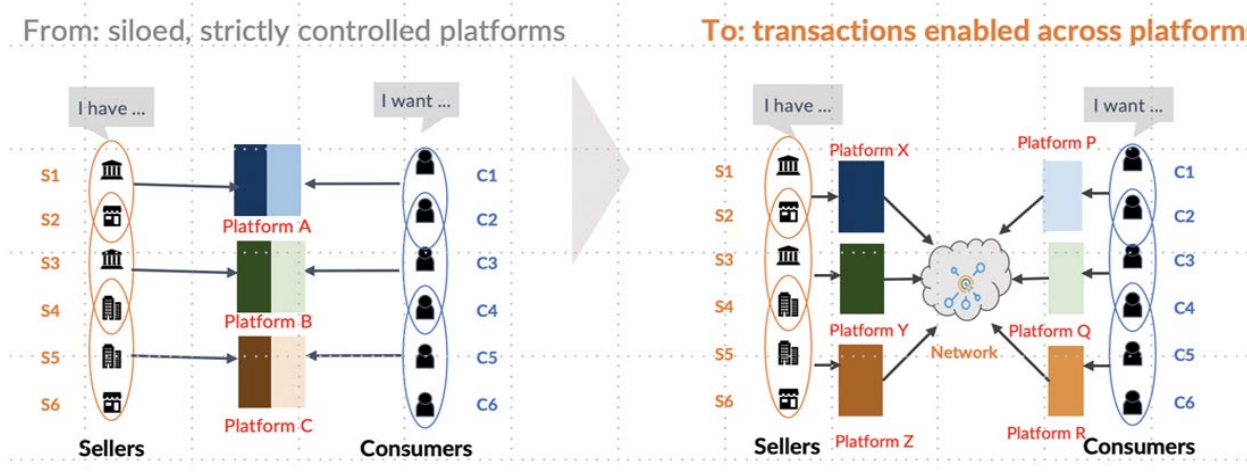
Currently MSMEs have to extend significant effort (time and money) to onboard onto an e-commerce platform and are, often, bound to its policies given limited alternatives and high cost of switching. With ONDC, these barriers will be reduced as more seller applications will be able to access the buyer universe through the network, and create an environment of healthy competition and innovation across the seller applications which will benefit the MSME's.

Since its incorporation, ONDC has launched alpha in 80+ cities across India and beta launched in Bengaluru with other cities in the pipeline to launch over the upcoming weeks. We have 20+ participants already 'live' on the network with over 600 in the pipeline in various stages of integration.

Alpha and beta testing have allowed us to iteratively improve the network experience and process, and we welcome further feedback from buyers and sellers transacting on ONDC on how to continue improving their experience.

In the upcoming months, we will be rolling out additional domains (e.g. fashion, electronics, B2B etc.) and enabling additional functionality (e.g. ONDC score, catalogue as a service) on ONDC, which will continue to grow, strengthen and build trust in the ecosystem.

There is a tremendous amount of excitement around ONDC in particular around the significant value that will be unlocked when the digitally unaware and smaller traders are enabled, which requires ecosystem participation



> The ONDC network enables communication across these buyer and seller apps through a gateway ensuring that all buyers interfacing with an ONDC-enabled buyer app will be able to access all the sellers (and their products)

ONDC initiative is currently helmed by its CEO, T. Koshy.

An IIM Bangalore alumnus, he was part of the founding team of National Security Depository Limited (NSDL) where he served as an Executive Director. He had a remarkable stint at Ernst & Young leading key digital transformation initiatives. Mr Koshy has been a pioneer in Digital ID and social protection initiatives and has played a leadership role in many implementations and consulting projects globally including the UID project of India, the largest ID program in the world, along with many other Digital ID initiatives globally.

Koshy has played a key role in many digital transformation projects in India, including the transformation of Pension Systems in India, the development of the Tax Information Network and the formulation of IT strategy and IT architecture for the implementation of Goods & Service Tax in India.

He has also assisted the World Bank with pension transformation projects and has been to China as a member of a pension reform mission. He has played a significant role in several e-Government initiatives, including the Unique ID project, the Expenditure Information Network, the Project PLATINUM for the development of a legal and IT framework for the Ministry of Urban Development's guaranteed land title, the Common Data Repository for the Insurance Sector, the E-Stamping initiative, and the automation of VAT functions in a few Indian states.

beyond just ONDC. Support in digital onboarding, inventory management, logistics coordination etc. will also become critical value chain factors in determining the success of these players, and we look forward to ecosystem-wide innovation and engagement to generate creative solutions to enable their participation and success in digital commerce.

For example, the One District One Product (ODOP) initiative is in the final stages of integration with ONDC and will be going live with their products on the network in the near future.

With ongoing state government support, a number of other initiatives like ODOP across the nation, which promote the ability of smaller traders and artisans to market their products nationally and eventually internationally, will also be joining ONDC in the upcoming months. This will not only allow artisans, weavers etc. to market their products digitally but allow customers all over India (and eventually the world) to access and appreciate indigenous products.

As we continue to grow, ONDC is expected to increase the penetration of e-commerce in India by fostering innovation in the digital commerce value chain, reduce barriers to entry for MSMEs and small traders/ artisans, and enhance buyer and seller interoperability across platforms.

Ultimately, there will be a paradigm shift in the way the digital commerce value chain will evolve giving rise to new types of players and innovations that will redefine the way ecommerce is seen in India and globally.

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[CONVERSATION]
UNION MINISTER

Rajeev Chandrasekhar
Union Minister of State for Electronics and Information Technology and Union Minister of State for Skill Development and Entrepreneurship

Rajeev Chandrasekhar Union Minister of State for Electronics and Information Technology and Union Minister of State for Skill Development and Entrepreneurship in conversation with Samir Saran at the recently concluded CyFy.

ON SEMICONDUCTOR AND CHIP OPPORTUNITIES AND INITIATIVES OVER THE LAST FEW YEARS.

I talked about semiconductor and electronics as a post COVID Supply Chain linked opportunity. And I think it was, it was in that context that we looked at that opportunity with the Honourable Prime Minister, then in December 2021.

We announced a $10 billion package for the semiconductor ecosystem. We've made considerable progress in the electronics microelectronics space since then and since 2014.

So just to give you a small summary of where we are, and it's a good way to compare the journey that India has had in electronics, and then therefore, how it's positioned itself for semiconductors.

In 2014, when Hon. Narendra Modi ji became our Prime Minister over 92% of all mobile phones and mobile devices consumed in India, were imported. In 2022, seven and a half years later, if you count the COVID years in between and over 97% of the mobile devices consumed in India are manufactured in India.

In 2014, we exported little or nothing and today we export over $12 billion dollars of electronics devices. With that confidence and clearly post COVID there is a desire amongst the world's consuming nations to diversify away from the concentration of the electronics value chains.

"Team India has to succeed for us to be building that $1 trillion digital economy"

That was very clearly embedded around one country for a large part of the last decade. That diversification has led to tremendous opportunities in electronics both downstream and upstream.

We have progressed considerably in semiconductors, we have launched a program where we will have a large number of startups that are focused on the future of design, the next generation of devices that will go into the electronics products, we expect the code to be designed in India, by Indian startups and or designed solely by Indian startups.

On the other end of the spectrum, we expect over the next 18 to 24 months for the ground-breaking on at least one or two fabs and at least one or two packaging units in some parts of India.

ON THE HUMAN TALENT AND TO BE THE HUB THAT INNOVATES AND CREATES

We have progressed considerably. We have a blueprint in terms of semiconductor research, we have semiconductor design, manufacture, and the entire ecosystem of other talent that is required to sustain a semiconductor ecosystem. We have not just a blueprint, but we have in a sense, taken an all of government approach in terms of integrating the higher education system, centres of excellence, other prototyping units, and working closely with the big multinational companies that are headquartered in places like Bengaluru, Hyderabad and Chennai. We are partnering with them to develop a talent strategy. I have no hesitation in saying that we will be not just a hub of talent for the India semiconductor ecosystem but also to a large extent be a partner for global nations and enterprises as well.

ON THE RECENT MEETING WITH ALL THE IT MINISTERS OF THE VARIOUS STATES OF THE COUNTRY

The headline to all the IT ministers of all states was that the Indian digital economy is dramatically expanding and diversifying from the two decade old narrative of tech services. The Indian digital economy story was built around these tech services companies not just BPOs. But technology solutions, companies like Wipro, Infosys, HCL etc.

They've done a magnificent job for the country and have created significant wealth and employment and opportunities of investment.

The last two years, the tech services business has averaged about at 18- 19% compounded growth. But there are new layers that are now emerging. The startup and innovation economy, the digital service providers, which is the 5G, ISPs the pipeline to the Internet. Then you have the electronics manufacturing piece of the economy, which like I said, 70% of the FDI in electronics has happened in the last three and a half years.

There is this whole emerging tech area of semiconductor design, AI blockchain all of these areas of deep tech innovation, that will also spawn a lot of digital economic activity.

I want the States to wake up to these new opportunities. Team India has to succeed for us to be building that $1 trillion digital economy. A goal set by the Prime Minister.

A classic example is how Gujarat moved on the semiconductor opportunity. The government of India laid out of incentive package of 50%, financial support and Gujarat clinched the first deal by saying that for the balance 50%, they will do a 40% subsidy.

ON DIGITAL PLATFORMS AND SOCIAL MEDIA APPS

For a long time governments of the world lagged the private sector in the way they looked at the Internet. And there was a certain utopian sense in governments around the world that the Internet should be left open. The government's role, the state's role should be limited. There's really no need for governments to intervene.

But we know now that as much as it represents a force for good it also represents significant examples of user harm. Misusing the Internet to create misinformation and public incitement, the dark web etc. There is a whole spectrum of problematic issues that have come up. So for us, the Internet's safety and trust is an absolute, almost like a fundamental duty of the government to its citizens. We've argued that open societies, democratic countries must come to a coalition of agreements around this boundary. In my interactions with the ministers of UK and the US and administrative officials of US, Australia, Singapore, there is now a growing realization that democratic countries must work together in shaping the future of the Internet. Shaping the future of technology in general. And there have to be some agreed to principles.

feedbackvnd@cybermedia.co.in

Neal Mohan
Chief Product Officer. Youtube

"Google spoke on a range of issues related to Youtube, content, regulation and the Creator Economy at the recently concluded CyFy 2022"

Some interesting extracts from his conversation with Samir Saran of ORF.

When I first started, YouTube in India was growing, but we really had just a handful of creators that were known nationwide with big followings. That number is now in the hundreds of thousands of creators. They are not just building wide audiences on YouTube but are building businesses. We commissioned a study a couple of years ago. The study showed that the creator economy in India on YouTube was generating almost Rs 6800 crores and 700,000 job opportunities.

We're doing a refresh on it. The new stats will come out in December.

So the impact that it's having on an aggregate basisis profound and penetrating the broader economy as well. For example, we had the swearing in ceremony of India's new President, live streamed on YouTube that got millions and millions of views. Thousands of creators make a living on YouTube.

For example, Rachna Ranade a former accountant is now a teacher. She teaches millions of Indians, particularly young women, how to manage their finances, how to think about the economy, how to be successful in it. I came across a creator called Kaizan English, she teaches English to native Tamil speakers. We are creating a place for diversity, vibrant economic growth, and also learning.

Further, the demography of this cluster that's emerging and the gender balance is seeing a new shift. The entire YouTube organization is very focused on this. Youtube is an open platform. Anyone can start a channel on youtube today. It is a place that doesn't have gatekeepers. It doesn't have curators, it doesn't have somebody saying, "You don't look a certain way or speak incorrectly" etc.

That inherent openness of the platform creates opportunities for incredible diversity. We haveall major Indian languages represented on our platform in terms of creator success. We have, lots of female creators. I

> We are a platform that has incredible relevancy in the Creator economy. That is a vibrant economy. It impacts tens of millions of people in India. So it is natural for governments not only in India but all over the world, to care deeply about what happens on these platforms.

don't have the specific breakout but just even those two examples I gave you both those creators have millions of followers on our platform.

Our focus is on making the place safe for creators while sharing their perspectives. A lot of the interactivity on YouTube occurs in the "comments below" the videos that you might watch.

We have tools that allow creators to moderate those comments to make sure that comments that might be hate filled or harassing in nature don't show up in the feed. We have moderation tools that ensure the creators don't have to see them as well. Creators feel safer.

YouTube is a place where creators come first. I think it is important for governments to play a role in determining how technology impacts their citizens and make sure that it is a place that works for their citizens.

We see those conversations happening all over the world. In Europe, there's the Digital Services Act. All over the world there are some common themes in this. One of them is the recognition that this open platform –for free expression, to share your ideas, creativity, opinion – is important.

Diversity wouldn't happen without an open platform. I do see recognition of that. But then also, I feel that there is a real opportunity for partnership between platforms like YouTube and governments, key stakeholders, policy makers, to make sure that YouTube isn't a place for mis-information, hate speech, etc.

And to be honest those would be my number one priorities, regardless of whether there's regulation or not. We have a comprehensive approach for living up to our responsibilities as a global platform.

We've 2 billion users who come to our platform every single month. Protecting those users is a toppriority regardless of whether there's a conversation with regulators or not.

2024 is going to be a crucial layer. The US, India and even the EU parliament will have elections. The overall atmosphere may become polarized and sensitive.

YouTube is a place where that discourse is already happening.

It happens around election cycles – people share their perspective, differing opinions – billions of times on YouTube. There was an election in Brazil recently. This is happening all over the world – multiple elections happening every year. We learn from all of them. We will put all of that learning to, to use when it comes to 2024. Whether it's the US election, the Indian election,

> I think it is important for governments to play a role in determining how technology impacts their citizens and make sure that it is a place that works for their citizens.

> When you upload a video piece of content to YouTube, our recommendation algorithms kick in. And we'll find over time, the people that are interested in that type of content wherever they live, anywhere in the world.

or other elections that are happening all over the world, our approach is comprehensive.

The first prong of our approach is making sure that we have clear policies around election integrity, or potential misinformation related to elections. How to vote, where to vote, candidate viability, all of those types of things which come into play during elections. We have policies where we remove certain type of content as quickly as possible. We have policies around violence, incitement to violence, hate speech, etc.

Our aim is to contribute to making sure that elections happen in a peaceful manner. But we don't just stop there with our policies. As you know, a lot of what happens on platforms like YouTube is about the type of content that is recommended.

We have a number of products and you'll see them in the context of the Indian elections, where we serve up information panels. So when users come to YouTube, they get accurate information from election authorities about voting.

In the US, we ran those panels when the results were certified by the states, so that we serve up authoritative content users are looking for. We actively make sure that we are not promoting misinformation on our platform.

YouTube is a means for connecting. Anybody with an idea or a thought and opinion, can share it with the world wherever their audience might be. When you upload a video piece of content to YouTube, our recommendation algorithms kick in. And we'll find over time, the people that are interested in that type of content wherever they live, anywhere in the world.

That is a really powerful tool for voices that might be minority that otherwise would not get a means to get amplified on traditional media outlets making it very hard for those voices to get discovered.

I was speaking to someone in Canada about a creator who does a lot of creative things with Bollywood music. They were in Canada, but they found an audience in India and other parts of the world interested in Bollywood content. They built up that audience. And then they became famous in Canada, the country that they live in, and sort of that virtuous cycle happens every single day. YouTube kind is a machine that enables those otherwise small or overlooked or diverse voices, to really find their community and find a way to prosper on the platform.

We have a set of community guidelines that are global in nature. The role of YouTube in the changing education scenario.

In terms of learning and education on YouTube, a lot of my internal product review conversations with my team revolves around it. I personally don't think that YouTube is going to be a platform that certifies learners. But that doesn't mean that we shouldn't partner with organizations that actually provide certifications. It could be traditional education organizations, it could be digital learning organizations. YouTube's role is the dissemination of that knowledge, a place where creators should be able to come and produce the content. Be it Physics or Algebra or how do you learn a particular vocational skill. Or how to cook a particular recipe. All of those are learning opportunities.

The types of tools and features and products that you should expect on YouTube are the things that allow educators — we call them edu-tubers – to do that at scale.

One of the products we're working on is to be able to actually stitch together a collection of videos into a course. And have checkpoints in that course so that somebody who's learning, say Algebra can move from one step to the other and progress on that journey in a systematic step wise manner. We're also thinking about ways that creators can generate economic value by putting their courses out there and earn a living. We

> If you're an advertiser, you use the Google Ad tools to actually measure not just reach and frequency, but the impact of your ads from, the effect of those ads; did they drive conversions? Did they drive the install of an app etc.

may have ways for those creators to work with third party organizations for things like certification. That's sort of how we think about the product vision.

YouTube is a place where hundreds of millions of hours of learning happening on a regular basis. There are lots and lots of creators that are in this edu-tuber category. Learning is probably one of our most salient use cases throughout the world.

A couple of weeks ago we started rolling out something called YouTube handles where you can actually have a specific unique identifier on YouTube, which is just yours. It is a way to create a unique identity. Not just for creators but for anyone who logs in. This unique person.

Youtube is very popular in a country like Bhutan. Some individual creators have more subscribers than even the national television channel. But Bhutan is not on the YouTube partnership program right now. As we want to ensure this platforms is global in nature and enables economic activity, just like in India, I want to make sure that countries like Bhutan also have those economic opportunities for creators.

I can't give a specific time on when we'll bring the YouTube Partner Program to Bhutan, but it is certainly our aspiration to be as global as possible with that program.

One of the things I haven't talked a lot about is how YouTube is a place where businesses, small businesses in particular, but all kinds of businesses are also thriving. And that's fundamentally because YouTube is an advertiser driven media model. The revenue that is generated on our platform comes generally from advertisers who are looking to reach audiences. We work incredibly hard to build products that cater to the needs of advertisers all over the world.

My goal is to continue to grow the advertiser ecosystem, not only is that good for small businesses and advertisers, but also good for creators as it generates more revenue for them. We share our revenue from all the advertising we generate with our Creator partners. And so that's how that ecosystem continues to grow.

One thing that I will say about businesses on our platform, is that businesses can be creators too. That is a paradigm shift in terms of how brands and businesses have thought about their business. I urge every business to have a presence on YouTube, set up a channel, build a channel.

Regardless of whether you're spending advertising dollars or not, you will attract an audience over time and that channel itself becomes a means by which you can build your overall business. You can communicate with your customers. You can drive your customers to your physical presence. You can amplify that voice through advertising.

All brands and advertisers and businesses should think like creators because this creator economy really is, is the future, especially with young people.

How do we measure business impact? First and foremost, whether you're a brand or an advertiser or a business, or even a creator, is really about viewership and engagement. That is really the way that you can judge whether your message is having an impact. As simple as the views on a video. But also about how users are actually engaging with your video content.

The Studio tool that you use to upload your videos, get all the stats on your videos. That is a tool that's available to creators to advertisers.

Additionally, obviously, if you're an advertiser, you use the Google Ad tools to actually measure not just reach and frequency, but reach and impact of your ads; the effect for example whether did they drive conversions? Did they drive and install of an app etc.

Advertisers are not going to want to be on YouTube, if the content is objectionable in many ways. And so we

> The bar to actually run advertising on Youtube is even higher than our community guidelines. Because there it's a commercial relationship. Community guidelines are about trying to balance free speech and the rules of the road.

have a moral obligation, but also a business obligation to do the right thing for our users and creators.

When I'm talking to stakeholders, or YouTube creators, and businesses, wherever they are in the world, the conversation really is about what can YouTube do to play its role in the local economy.

So the success of creators, the success of small businesses, is really the fundamental way that YouTube contributes.We obviously also do things above and beyond that, by, sponsoring entrepreneurship. It really is about making sure that creators and businesses can thrive on a platform like ours. That's obviously a direct way that we can contribute. Creators employ people, they give jobs to other people, they educate millions of people. And so the impact is real.It's all happening through our platform.

To make sure that it is not a place for organized crime, we have a comprehensive approach. We have policies, we use a combination of pretty sophisticated machine learning technology and artificial intelligence that continues to get better. And we have 1000s of highly trained individuals all over the world, on the ground in places like India that are enforcing our policies against criminal organizations, against terrorist organizations. Content from such organizations is not allowed on our platform.

We're not perfect but we endeavor to remove this type of content as quickly as possible.We are always investing more in our technology to catch this even more accurately and fast. We do things like being able to detect firearms but itis not as simple as just being able to detect a gun in a video. A gun might be a legitimate use case be it for hunting or a law enforcement officer, or a military officer. So we need to be able to use a combination of machine learning and artificial intelligence and use highly trained individuals to make a decision as rapidly as possible about the context. This is a difficult challenge, but we take it on a daily basis.

In the last quarter, we removed nearly four and a half million videos from YouTube. And keep in mind, this is from a corpus of billions and billions of videos. Something on the order of over 70% were removed with 10 views or less.

So there is very minimal impact of violative content on our viewers.

We launched a new product on YouTube called YouTube shorts. And it is about short form content. Vertically oriented content, obviously, lots of platforms do that. But that is one of the fastest growing types of content on YouTube. I consume a lot of this. My favorites being sports. I watch everything from basketball, to cricket to football — both American football and what the rest of the world calls football. But shorts is super fun and interesting. I see every week some new remixes of Bollywood songs.

feedbackvnd@cybermedia.co.in

Dhananjay Ganjoo
Managing Director India & SAARC, F5 Inc

"Cybersecurity in the Telecom Sector and impact of 5G on Cybercrime — 5G networks can potentially open doors to DDoS attacks"

In a chat with Voice&Data ***Dhananjay Ganjoo, Managing Director India & SAARC at F5 Inc.*** *shares his thoughts on the current and future security landscape in the Telecom Industry.*

F5, a multi-cloud application security and delivery company enables some of the world's largest enterprises, financial institutions, service providers and governments in the area of secure digital experiences.

HOW IS THE CYBERSECURITY LANDSCAPE CHANGING SINCE WE'VE ALMOST COME OUT OF THE PANDEMIC?

The pandemic accelerated the digital journeys of businesses, and with the invention of new technologies, security has become a primary focus area. Additionally, businesses becoming application-dependent has further increased the demand for cybersecurity, irrespective of the size of the business.

HOW DOES INDIA STACK UP AGAINST OTHER REGIONS REGARDING CYBERSECURITY PREPAREDNESS?

In the past few years, India has witnessed a major uprise in cyberattacks across all industries. Therefore, it has become imperative for the nation to adopt security practices to protect themselves in this digital transformation era. Multi-factor authentication for applications and networks was introduced in India, much ahead of the rest of the world. Businesses are not just adopting regular cybersecurity practices but also focusing on biometric and third-party data protection. For instance, financial institutions in India have deployed technology to protect them and their customer data from infected PCs. While India is on the right track, we have a long way to go when it comes to the adoption of holistic cybersecurity strategies.

HOW LARGE IS INDIA AS A MARKET FOR F5?

India is a significant market for F5, and we have a base of

> According to a report, India has experienced 193 million cyberattacks on application program interface (API), making it the 5th most attacked country in the world. The cyberattacks have been more focused on financial (22.6%), e-commerce (30.2%), and other digital media sectors (32.6%).

> Cybercriminals could use the high speed of 5G networks to amplify their existing modes and develop new ways of attack. The deluge of data involves IoT devices while creating multiple endpoints, thus allowing attackers to access the data through various routes.

1000+ customers. Operating for more than two decades in the country, F5 has its largest R&D center in Hyderabad, with 700+ people working towards new developments and innovations.

FROM AN F5 PERSPECTIVE, WHAT STEPS OR INITIATIVES HAVE BEEN TAKEN TO STAY AHEAD OF THE COMPETITION?

In earlier days, applications were commonly built on monolithic architectures with complex codes, making it difficult for businesses to secure them.

The pressing need for businesses to undergo digital transformation to stay relevant in the market, led to the increase in cloud adoption and an upward trend to host applications in multiple locations. To address this growing demand, F5 transitioned from a hardware centric to a software-oriented business, with a mission to enable companies to move and host their applications anywhere without compromising on security.

With F5 Distributed Cloud Services paving the way for multiple points of presence (PoPs) worldwide, with a couple planned to go-live shortly in India this Quarter. With these PoPs, F5 offers Web Application Firewall (WAF), Web Application and API Protection (WAAP) , DNS security, DDoS services, and cloud workload protection services, enabling infrastructure as a code or platform-as-a-service to its customers. We further connect applications on different clouds, offering security and data communication to our customers. Therefore, these unique solutions help F5 to stay ahead of its competitors.

PLEASE SHARE THE INVESTMENT PLANS FOR FY22-23 FOR INDIA.

We have been operating in India for about two decades now and have a large sales force, which we see growing further in the future. Currently, we have a vertical strategy with an increased focus on BFSI, telco, government, large enterprises, IT/ITeS, pharma, and manufacturing.

India is a significant market for F5, and we have a base of 1000+ customers. Operating for more than two decades in the country, F5 has its largest R&D center in Hyderabad, with 700+ people working towards new developments and innovations.

Currently, F5 has a vertical strategy with an increased focus on BFSI, telco, government, large enterprises, IT/ITeS, pharma, and manufacturing. In addition, it is heavily investing in building up R&D centers in India. Apart from the R&D center in Hyderabad, F5 is planning another center in Bangalore.

In addition, F5 is heavily investing in building up R&D centers in India. Apart from the R&D center in Hyderabad, we are planning for another center in Bangalore to accelerate technology innovations. Furthermore, we focus on increasing investment in F5's Distributed cloud WAAP, application security, and NGINX services.

WHAT ARE THE EMERGING AREAS AND KEY VULNERABILITY TRENDS IN 5G NETWORKS AND SERVICES?

According to a survey by Trend Micro, 39% of organizations cited security as the largest concern in the 5G era. 5G attracts IoT devices, further expanding the attack surface and accessibility of the network to bad actors. Data transfer, information sharing, and third-party systems are primary areas of concern. In addition, hosting applications on distributed edge compute sites brings new security threats as 5G's powerful connections can potentially accelerate the attacks even further.

> In the past few years, India has witnessed a major uprise in cyberattacks across all industries. Therefore, it has become imperative for the nation to adopt security practices to protect themselves in this digital transformation era.

Hence, it is important for businesses of all scales and sizes to focus on a holistic security strategy.

IN THE VIEW OF F5, WILL THE LAUNCH OF ENTERPRISE 5G AND PRIVATE NETWORKS CREATE ADDITIONAL CONCERNS? WHAT ARE THEY?

The primary concern here is security. Cybercriminals could use the high speed of the 5G network to amplify their existing modes and develop new ways of attack. The deluge of data involves IoT devices while creating multiple endpoints, thus allowing attackers to access the data through various routes. Additionally, 5G networks can potentially open doors to DDoS attacks, leading to risks in protecting a sophisticated network of connected devices, where compromising one device can lead to affecting the whole network.

IS F5 FOCUSING ON 5G? WHAT ARE YOUR PRODUCTS THAT SPECIFICALLY ADDRESS THIS SEGMENT?

With 5G creating a lot of buzz recently, all businesses are looking toward leveraging the power of the network for better performance. While offering reliability and agility, it also brings security concerns. To overcome the 5G security challenges, F5 provides solutions to scale, automate, and secure the 5G innovation that works from the core to the edge.

F5 leads in the application, network, and security and offers a wide range of 5G security and infrastructure solutions. We provide two main products that address service providers' challenges while building the cloud-native infrastructure to support the 5G ecosystem, which are F5 BIG-IP Service Proxy for Kubernetes and Carrier-Grade Aspen Mesh. BIG-IP SPK aligned with Kubernetes design patterns for configuration and orchestration to enable greater performance and scalability in the 5G infrastructure. Further, with Carrier-Grade Aspen solutions, F5 provides network flexibility, scalability, and the visibility one needs for troubleshooting and signaling control.

HOW DOES CLOUD FIGURE IN THE 5G SECURITY SUITE, AND HOW WILL F5 FIT INTO THIS?

Introducing the fifth generation of the network brings tremendous changes in cloud computing. The higher speed and lower latency will be a catalyst for cloud computing services. Cloud computing intertwined with 5G provides a new world of innovations and opportunities for businesses by increasing accessibility, greater IoT connectivity, improved security, enabling edge computing, and real-time insights.

F5 Distributed Cloud Services provide a platform to overcome the complexities of 5G network deployment and operating operations and services across multiple shadows from the core to the far- edge and into the enterprise edge. Service providers can gain a faster time-to-service to start monetizing their investments while delivering on the pledge of 5G.

SHARE SOME INSIGHTS ON RECENT CYBER THREATS IN INDIA AND HOW F5 PLAYED A ROLE IN MITIGATING THEM

India has a leading API economy, with banking and e-commerce industries largely using APIs, attracting bad actors to switch to these types of attacks. According to a report, India has experienced 193 million cyberattacks on application program interface (API), making it the 5th most attacked country in the world. The cyberattacks have been more focused on financial (22.6%), e-commerce (30.2%), and other digital media sectors (32.6%).

F5 Distributed Cloud WAAP (Web Application and API Protection) protects apps and APIs deployed across cloud, and edge sites and provides fully integrated, best-of-breed WAF offerings, bot protection, advanced API security, and DDoS attack. Unlike traditional WAAP offerings, F5 Distributed Cloud solutions simplify security policy enforcements for distributed applications spanning multi-cloud, data centers and edge locations.

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Automating to Address India's Varied 5G needs

5G is poised to boost the adoption of other digital technologies and improve everything from financial services, education, to retail

BY KAILEM ANDERSON

With 5G auctions recently concluded, India is all set to witness the launch of commercial 5G services later this year. There is a general consensus that 5G is likely to have a transformative impact with India's telecom regulator highlighting that it can potentially contribute as much as $1 trillion rupees to the economy by 2035.

Even so, the reality is that the adoption of 5G will be different in different parts of the country. Depending on the available use cases in each market, every mobile and wholesale network operator will decide on their 5G investment based on their business objectives, maturity of available infrastructure, and application spaces.

Against this backdrop, how can service providers (SPs) maintain a business edge while ensuring consistent performance and user experience across India?

MEETING THE NEEDS OF A DIGITAL INDIA

Beyond faster internet connections for consumers, 5G is also poised to boost the adoption of other digital technologies and improve everything from financial services, education, to retail. This is especially relevant in India, providing the opportunity to extend financial services and education coverage in remote and yet-to-be-connected areas.

However, the growth of 5G, higher-speed broadband adoption, and enterprise requirements for cloud

Automated processes are going to be vital in ensuring that operational processes work together without a glitch. In addition, several models of working together will evolve as 5G matures and its infrastructure needs to be agile and flexible enough to enable innovation in business models.

services are pushing SPs and content providers to build and scale their network closer to their customers. As the network edge rapidly evolves, having an efficient metro network architecture to meet city-wide connectivity demands—while maintaining scalable operations—is critical.

That's where new coherent routing platforms that provide improvements in power, cooling, and transport operational efficiency, can become game-changers. These platforms enter at a time when there is growing appetite for broadband initiatives that will drive aggressive passive optical network (PON) deployments and increase demand for aggregation of network traffic at the edge. SPs want adaptable routing platforms that will simplify operations, reduce costs, and eliminate the need for manual technician intervention.

MANUAL PROVISIONING AND MANAGEMENT NO LONGER POSSIBLE

In a 5G world, relying on manual provisioning and management processes is simply not sustainable. It is important to note that many core assurance requirements are not changing. SPs still need to collect, correlate, and visualize network events – performance metrics, faults, and alarms, for example – and fix problems manually. However, to build effective 5G networks, SPs now need to do it at a massive scale.

To resolve this challenge, SPs need an additional level of intelligent automation that can only be provided by Artificial Intelligence (AI) and machine learning to automate the trouble-shooting process, to deliver the cloud-like network experiences customers want. This can help SPs identify problems before they affect customers and lower operational costs in the long run.

Further, intelligent automation also enables network slicing, a key feature of 5G. Network slicing enables service providers to use the same physical infrastructure to deliver dynamic services with different speeds, availability, and speed requirements.

Automation is essential for every stage of the service lifecycle because thousands of dynamic network slices will need to be provisioned in real-time across physical, virtual, and cloud-based domains. All this will lead to network complexity, which cannot be addressed with legacy infrastructure and manual processes. SPs will need to incorporate intelligent automation in service assurance to introduce new capabilities quickly.

COLLABORATING TO BUILD AN ECOSYSTEM

A 5G ecosystem will involve hyperscale cloud operators, system integration partners, content providers, and software vendors. While SPs bring in fixed and wireless network infrastructure; the cloud infrastructure comes from hyperscalers; and system integrators ensure that all the hardware and software systems work seamlessly together.

As India moves closer to the launch of 5G services later this year, there is a need to bring all these stakeholders on a common platform to leverage the 5G opportunity. Automated processes are going to be vital in ensuring that operational processes work together without a glitch. In addition, several models of working together will evolve as 5G matures and its infrastructure needs to be agile and flexible enough to enable innovation in business models.

2022 will be fundamental for 5G in India and will set the tone in building a dynamic 5G ecosystem. SPs will need to leverage intelligent automation in all aspects of the network, from network planning to implementation and monetization, to deliver on the promise of 5G. SPs are not alone. There is an ecosystem of partners that can share expertise, knowledge and experience to ensure SPs are able to compete and win in India's 5G race.

Kailem Anderson, VP, Portfolio & Engineering, Blue Planet.
feedbackvnd@cybermedia.co.in

RDK powering Customer Premises Equipment

RDK started as a middleware for Set Top Boxes and later evolved to support home routers. TVs and Surveillance Cameras are the latest addition to the RDK portfolio

BY PRET JOSEPH

RDK (Reference Design Kit) is a fully modular, portable, and customizable open-source software solution that standardizes core functions used in video, broadband, and IoT devices. It started as a middleware for Set Top Boxes and later evolved to support home routers. TVs and Surveillance Cameras are the latest addition to the RDK portfolio. The main USP of RDK is that it's driven by the operator community and is supported by ecosystem partners like Chipset, CPE Manufactures and System Integrators. RDK offers a ready foundation for operators with a:

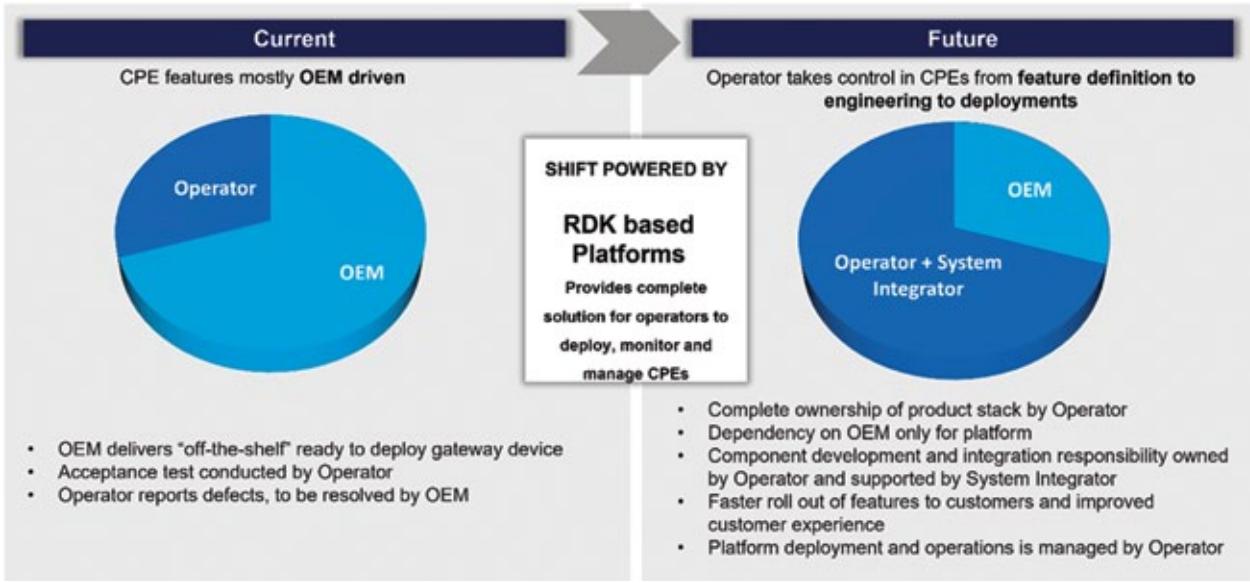
- Tried and tested stack
- Accelerator platform to improve time to market
- A set of test suites to qualify the device
- Data for improving customer experience and business results

Today RDK community has expanded to more than 600 technology companies with continued adoption across Europe, North America, LATAM and Asia. Recently RDK device deployments crossed 100M testifying to the global adoption and support it provides to operators. Due to its participative nature, RDK has scaled in its features, efficiencies and has a clear roadmap to align with the requirements of the operator community.

EVOLUTION OF RDK AND ITS IMPORTANCE

Traditionally, gateway requirements of operators used to be driven by a set of OEMs. The roadmap used to be determined based on a common set of priorities. Roll out of custom features and fixes used to be a major challenge for the operators. RDK helped operators overcome these challenges by gaining more control over the software in the gateways. In case of RDK, OEMs provide the base RDK platform, and the operator can add customisations on top of this platform. The base platform is standardised across the OEMs, and this enables operators to port their customised RDK stack to any of the compatible platforms. This approach enables operators to have a unified code which can be deployed across multiple OEM's platforms, countries, or WAN interfaces. It helps in developing a feature once and deploying it anywhere, as well as fixing a defect once and deploying it across OEMs, regions or across different access technologies. With the evolution

> Today RDK community has expanded to more than 600 technology companies with continued adoption across Europe, North America, LATAM and Asia.



CPE Engineering – Paradigm Shift

of RDK, operators now have the agility to defect fixes, feature rollout, and has empowered them to:

- control their ecosystem
- innovate to meet their product vision
- deploy at own pace
- control customer data and applications
- improve customer experiences
- reduce engineering costs

EVOLUTION OF RDK AS A WHOLE HOME PLATFORM

RDK stack has been in the Set Top Boxes for a decade and the latest additions to this is the RDK TV profile (which can be ported in TV itself) and the RDK based surveillance cameras which have made their presence in the market. Operators today are working with OEMs to promote RDK stack in TVs directly. Sky Glass is a recent example for this, and the other major operators are following suit. RDK broadband was launched with the cable (DOCSIS) interface and has evolved to support DSL, Fiber, and the LTE interface today. The RDK broadband has also evolved to keep pace with the evolution of Wi-Fi to provide a seamless whole home Wi-Fi experience. Today RDK support various Mesh standards and the latest Wi-Fi standards.

Surveillance and IoT is going to be the next big thing for operators. RDK is supporting surveillance through RDK C flavor and is already deployed with some of the operators. IoT support started integrating to the RDK stack in 2021, and in 2022 will see Matter 1.0 support getting added to the stack. The beauty of RDK is that if there is a specific IoT stack, then the operator will be able to integrate it and not wait for the community to release it. With Wi-Fi evolution, RDK has been adapting all standards of Wi-Fi from 2 to the latest Wi-Fi 7, hence the basic priorities are met. Thus, RDK ecosystem is geared up for meeting the latest surveillance and IoT needs of operators. Be it features or functionalities, RDK is aligned to the technology trends and operators needs in its specific area.

DATA, LOGGING AND TELEMETRY IN RDK

Data is a key differentiator for RDK. RDK supports a whole lot of data models for every functionality. The logging provided by RDK stack is also extensive. The telemetry function of RDK leverages the data models and the logs for vital information on the state functionality and issue

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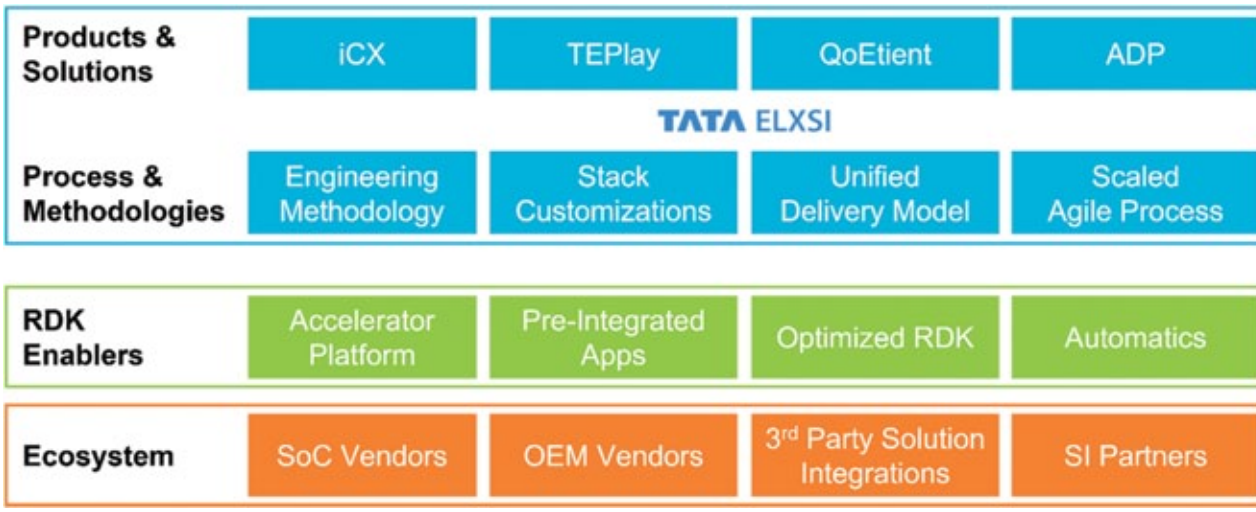

Tata Elxsi solutions, process, and methodologies for RDK enablement

related to the CPE device. This data can be uploaded to solutions like the Tata Elxsi iCX to provide intelligent monitoring of millions of devices deployed to the field as well as provide proactive issue resolution.

TATA ELXSI AND OUR CONTRIBUTION TO THE RDK COMMUNITY

Tata Elxsi an RTAB (RDK Technology Advisory Board) member has been actively involved in the RDK community since its inception in 2012, collaborating with key operators and OEM partners to provide end to end services ranging from consulting (to ascertain the requirements like mapping, timelines and budgets) to RDK System integration, from Deployment Support to Post Deployment. Tata Elxsi has been the partner for leading MSOs for their Commercial RDK deployments across European and American markets. We also have started engagements in APAC region. Our experience helps customers undertake risk free RDK deployments. We have developed customised processes for RDK deployment. Our Engineering Methodology helps in a phased product development, Risk Handling, and better Planning to meet Budgets and Timelines.

Tata Elxsi has invested in RDK and has developed a set of solutions, accelerators, and processes to extract maximum value from RDK deployments. The Unified Platform Engineering process help operators to manage Multi-Platform, Multi Country deployments through Common Codebase, Test & Maintenance Strategy. Tata Elxsi brings its solutions and accelerators for helping operators in RDK deployments. We have products like iCX (Intelligent Customer Experience Management Platform) which collects data from millions of field deployed devices and provides an enhanced customer experience based on this data. iCX also helps operators with faster issues resolution, reducing call center interactions and truck rolls thereby reducing the OPEX. We are offering our service delivery platform to deploy third party services on home gateways. This in turn improves the functionality of the gateway and helps operators differentiate and monetize its offerings.

On the security aspect, Tata Elxsi's Automated Security Testing Framework (STAF) is efficient in identifying and mitigating risks associated with RDK devices. STAF allows users to integrate it with their own infrastructure. It can also be deployed in a cloud environment to ensure availability and reliability. STAF is a security focused framework that can be integrated into an existing CI/CD pipeline. This allows an organization to eliminate security risks right from the early stages of development and brings in a cultural shift towards a secure environment. The framework constantly evolves along with the trends of cyber-attacks and has proven to be reliable.

Pret Joseph is the Practice Head, RDK at Tata Elxsi.
feedbackvnd@cybermedia.co.in

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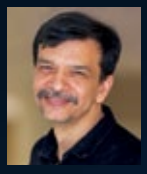

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Building Connected, Insight-driven businesses

Cutting-edge Data Analytics to deliver 360° impact and ROI-driven outcomes along with superior digital customer experiences

BY RAKESH PRASAD

Businesses today are embracing Digital Transformation in order to drive new revenue streams and succeed in the hyper-competitive environment. Data is the quintessential information stack that can help organizations to unlock the full impact of their capabilities and accelerate the path towards becoming a customer-centric, intelligent enterprise of today.

For the same reason, board room discussions are shifting towards building connected ecosystems driven by insights, powered by cutting-edge technologies, and accentuated by experiences to deliver 360° impact and ROI-driven outcomes. With right Digital & Analytics capabilities, businesses can expedite their 'data-to-insights' cycle, feed the insights to deliver superior customer experiences across all engagement channels – be it offline , digital or even Metaverse. In fact, the world of Metaverse is slated to generate huge amounts of data for every user, and enterprises will require robust data Analytics capabilities that can assimilate, segregate and derive useful inferences from available data to drive the in demand hyper personalized offerings in virtual world. But how ready are organizations to successfully tap and extract value from the available data?

THE CHALLENGE OF EVER-EVOLVING DATA LANDSCAPE

According to a recent report by Fortune Business Insights, the data analytics market is projected to grow from USD 231.43 billion in 2021 to USD 549.73 billion in 2028 at a CAGR of 13.2% in 2021-2028 period. But is all the data useful? How do you differentiate data from noise? Many organizations are still struggling to maximize the gains possible from their data and analytics projects. They often realize that their analytics models fail to answer their most pertinent questions. The reason: a superficial understanding of the power of data. Many enterprises generate copious volumes of data but draw no meaning from that data. Some are analyzing data that can neither create value nor deliver returns.

Another challenge faced by companies today is the need for accelerated insights. With availability of data in unstructured volumes, the leap from data to significant insights is tedious and extremely time consuming. The processes to make data sets tangible takes upto 60% of the manual time, apart from the actual derivation of value from these data points, resulting in the data and the insights from it becoming old news. A recent industry

survey states that 72% of respondents struggled to optimize their data and analytics capabilities and failed to become a data-driven organization.

ACCELERATE DATA-TO-INSIGHTS-TO-BUSINESS OUTCOME JOURNEY

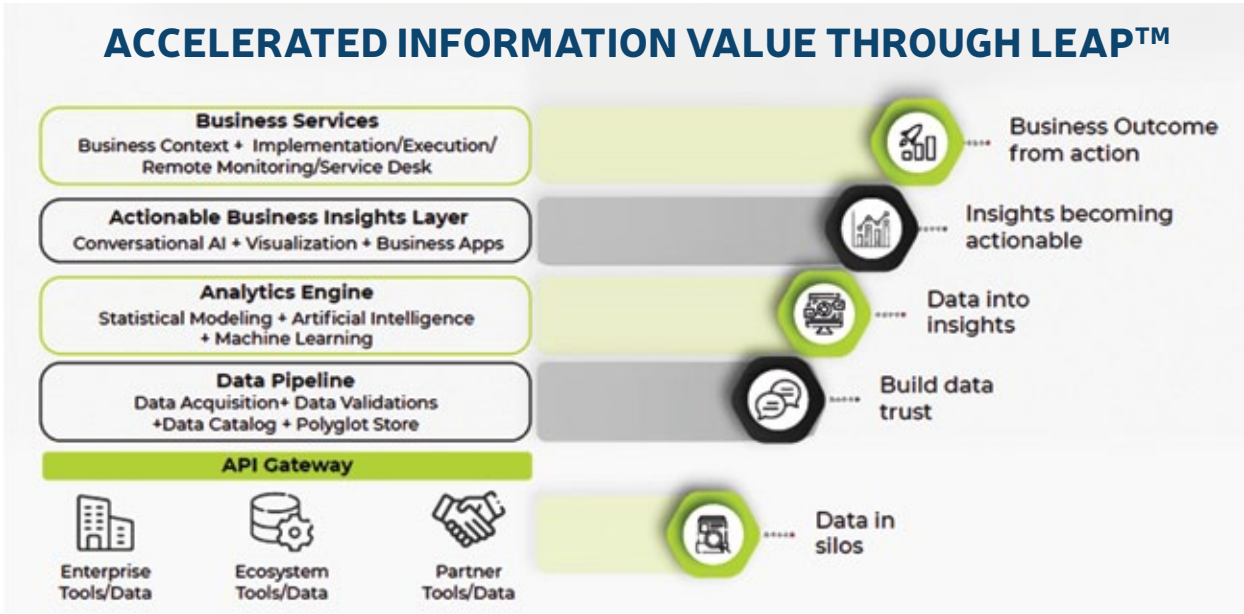
Global enterprises need to bind their data and analytics strategy with business outcomes in order to transform into data-driven entities. They need to build strong capabilities across all areas of data-to-insights cycle including Data Engineering, Data Science, Advanced Analytics, AI, Data visualizations, governance and more. Combine this with cutting-edge products, industry-specific accelerators and frameworks, and they can uncover accelerated and differentiated business value – accurate and relevant insights, faster time to insights, reduced cost per insight and better ROI on their analytics investments.

Keeping in mind the industry demand for faster and accurate insights, Innover's Advanced Analytics platform – LEAP™ – has been at the forefront of accelerating the data journey, from the time when it is captured to the eventual insights that it offers for informed decision-making. It can combine large volumes of structured and unstructured data from multiple internal systems and external data sources. The platform then creates a reliable data pipeline suitable for analysis by ensuring that the available data is complete, accurate and secure with robust audit-trail, tamper-resistance and adherence to Enterprise data standards. By applying statistical and Machine Learning algorithms, LEAP's Analytics Engine helps to turn this data into powerful business insights. Through the business insights layer, LEAP can expedite enterprise wide data-driven decision making by providing on demand, role based secure data access via multiple consumption tools and conversational AI. Finally, the business services layer on top can help enterprises to apply these insights to drive tangible outcomes in the fastest turnaround time.

HOW IS LEAPTM DIFFERENT?

LEAP's uniqueness lies in the fact that it is modular, scalable, and technology-agnostic. It can be leveraged at any stage of the analytics journey, deployed across technologies, and can scale according to the needs of the business. Leveraging its pre-built accelerators and frameworks, LEAP shortens the deployment cycle and ensures first-time accurate results with minimal iterations, resulting in tangible business outcomes. It's ready-to-use industry-specific algorithms for Supply Chain, Marketing, Manufacturing, and Logistics can be modified based on the variables and data sources available; substantially increasing the speed of analytics implementation. This ensures first-time accurate results with minimal iterations, resulting in tangible business outcomes. One of the key highlights of LEAP is that it is self-funded i.e. it provides 3x+measurable returns for an organization in just 8-12 weeks by selecting the right POC based on rigorous Time-ROI-Implementation comparison.

From Demand sensing to supplier risk profiling, Customer churn prediction to Media Mix optimization, Asset management to Predictive Maintenance , network route optimization to capacity planning; LEAP's ready-



> Many enterprises generate copious volumes of data but draw no meaning from that data. Some are analyzing data that can neither create value nor deliver returns. Another challenge faced by companies today is the need for accelerated insights.

to-use industry-specific algorithms for- Supply Chain, Marketing, Manufacturing, and Logistics - only need to be modified based on the variables and available data sources; substantially increasing the speed of analytics implementation.

LEAP: BUILDING RESILIENT SUPPLY CHAINS

LEAP has been addressing the myriad challenges of global supply chains such as visibility, fluctuating demand, rising customer expectations, etc. It helps organizations build resilient supply chains by driving visibility across all touch points, increasing velocity, and improving responsiveness across the entire value chain. It enables organizations drive proactive & prescriptive decision-making around critical areas of demand sensing, network route optimization, capacity planning, inventory optimization, route optimization, etc. that deliver superior customer experience, enhance profitability, and drive substantial cost-savings.

A Texas based Energy and Utilities Company had its supplier base spread across the US. With pandemic affecting countrywide supply chains, the customer wanted to get real-time visibility into risk elements associated with their active supplier base to prepare for material and manufacturing capacity shortages. Innover developed an Artificial Intelligence and Machine Learning powered Supplier Risk 360 platform to categorize and rank high risk and critical suppliers in a record 8 weeks. The platform helped to reduce shipment delays by 31% through proactive supplier communications and interventions.

LEAP: REIMAGING AND STREAMLINING OPERATIONS

LEAP has been instrumental in streamlining operations and addressing previously impenetrable problems of global organizations. It can help in Asset Management, Predictive Maintenance, Scheduling and Dispatch optimization, Overall Equipment Effectiveness (OEEE), Cost Optimization, Operation & Quality Monitoring and much more to decrease downtime and avoid any business disruption.

A leading Telecom company was leaking revenue as around 20%-25% of their truck rolls were ending up being "unproductive." This also resulted in the loss of customer base and diminished brand image. Innover institutionalized an end-to-end automated unproductive truck-roll mitigation solution which identified 16 individual causal factors of truck-roll failure by analyzing 25+ data sources and 100+ candidate variables and helped our client drive a 30% reduction in unproductive truck rolls & approximately USD 7Mn in annual savings.

LEAP: DRIVING SUPERIOR CX AND MAXIMIZING ROI FOR MARKETING

LEAP's Customer Analytics and Marketing algorithms help organizations by providing a complete view of customer behavior and preferences across channels and touch points helping them deliver superior customer experience and paving the way for accelerated ROI on digital spends. LEAP also predicts customer churn in advance and analyzes customer lifetime value to ensure organizations take necessary steps to retain high value customers. LEAP can also help organizations maximize their return on advertising spend from their marketing campaigns through full-funnel fractional attribution-led media mix strategies. It explicitly estimates direct & cross-media effects (assist, cannibalization, halo, and pull-forward) to measure 'true' media effectiveness in an 'always on' omnichannel setup.

A leading bakery ingredient manufacturer was catering to bakeries, supermarkets or specialty stores. However, a high majority of their customers were going inactive or churning just after a few orders. The client wanted to understand the reason behind high inactivity/churn risk propensity and take proactive measures to eradicate customer churn. Innover leveraged its proprietary Analytics Platform - LEAPTM ready-to-use algorithms for customer churn prediction to resolve client issues with speed and precision. The solution resulted in 80% accuracy in identifying businesses most likely to churn and 30% reduction in revenue loss.

MAKING ORGANIZATIONS FUTURE-READY TO SUCCEED IN A DATA-DRIVEN WORLD

Innover will continue to invest significantly in building and leveraging the LEAPTM algorithms for more rapid data ingestion, finding information value for the right variables and leveraging the right AI/ML models for

the problem at hand. The plan is to expand and build more use cases for businesses across Supply Chain and Manufacturing, including Retail, CPG, Telecom, Energy & Utilities and Technology. The expansion across industries will help enable accelerated value and ROI for the entire customer base.

Innover as an organization is making a positive impact for its global enterprises by bridging their data and analytics strategy to business outcomes and helping their customers become connected and insights-driven businesses. From current data maturity assessment to redefining future roadmap; combining structured and unstructured data sources to building robust trusted data pipelines, automating data engineering processes to migration to cloud, Innover provides solutions that cater to unique customer needs. With delivery centers across 15 global locations, Innover is fusing intelligence across business functions for Supply Chain, Manufacturing, Logistics, CPG, Energy & Utility, BFS and Healthcare sectors.

METAVERSE EMERGING AS A KEY ENABLER FOR BUILDING EXCEPTIONAL EXPERIENCES AND CUSTOMER ENGAGEMENT

The Metaverse is an opportunity for businesses to challenge the frontiers of imagination and digitally realize unforeseen possibilities backed by the latest technologies, digitally monetizing assets, offerings, products and services. The avant-garde tech is poised to succeed the web or internet as we know it, opening gateways to endless possibilities and whopping profits. Through the elimination of geography, the Metaverse creates fascinating new opportunities for industries like consumer & retail, services, e-learning, healthcare and more.

Innover is helping businesses to tap the potential of Metaverse across industries and deliver gratifying experiences through its Metaverse powered Digital Experiences services. For a leading Telecom company, Innover is building AR/VR and analytics powered Metaverse Lounge to address all questions and issues not just related to network but across the complete connected home ecosystem covering Apple, Amazon, Google and other leading connected products. The Metaverse Lounge provides a real life environment and experience to the customers while conversing with the agents – enabling clear and faster resolution and more personalized assistance. The Metaverse Lounge is integrated with the ability to help users see and interact with the products, understand various functionalities, and compare related products to help them in the purchase decision. The Analytics layer on top of the solution generates insights on customer sentiments across the entire customer engagement lifecycle, along with behavior analysis, to drive better cross-sell and up-sell opportunities.

In Consumer industry, Metaverse use cases can help users in experiencing lifelike immersive virtual tours for luxurious hotels and destinations, exploring new restaurants, indulging in immersive shopping experience for high-end brands, creating virtual office spaces, trade shows and experience centers and more. Metaverse also delivers an immersive and safe environment for employee Training & Development. Service teams can experience virtual models of all the cutting-edge tool and gadgets offered in the market; they can zoom in, flip, rotate and use these products to get acquainted with product specifications and functionalities. In industries such as Manufacturing and Oil & Gas, where technicians can get exposed to unsafe malfunctioning equipment or hazardous work conditions, Metaverse provides a safe and risk-free environment to practice resolving issues without any risks.

The idea of the Metaverse is that a greater portion of our lives, work, leisure, time, wealth, happiness, and relationships will be spent inside virtual worlds. The technology will enable businesses to create new revenue streams across industries, open exciting brand engagement opportunities and ignite the demand for virtual products and fascinating experiences. While we are in the early days of the Metaverse, futuristic organizations will surely utilize the tech to build digital twins, drive unprecedented levels of automation and personalization and deliver exhilarating customer experiences.

CONCLUSION

As the Metaverse grows, businesses will have the opportunity to extract and analyze swathes of data, whether it is in-house, Zero party or third-party. Organizations with the strong digital & analytical expertise will be able to convert the data from a siloed nuisance to a crucial differentiator, ensuring real-time interpretation of data and actionable results. This will equip businesses to foray into the data-driven world of Metaverse and decode the reality of the virtual universe through a data analytics lens. By combining the power of Data Analytics and Metaverse, businesses can amplify their uniqueness, accelerate their digital journeys and supercharge progress.

Rakesh Prasad is the Senior Vice President - Digital Services at Innover
feedbackvnd@cybermedia.co.in

Still wary about the public cloud? Let's debunk the myths

Get on the public cloud train. The journey won't be painless, but the payoff will be huge

BY DANIELLE ROYSTON

2022 has been the year of the public cloud in telco. Forward-thinking leaders are embracing its competitive advantages and cost savings and starting their digital transformation.

While it's exciting to see more and more telcos starting their public cloud journeys, I still hear excuses from telcos that suffer from analysis paralysis. This isn't unexpected—major advances in technology have always been greeted by resistance to change. But my advice to those who need a boost of courage? Get on the public cloud train. The journey won't be painless, but the payoff will be huge.

Let's break down the most common concerns I hear from telcos that are slow to move.

MYTH #1: THE PUBLIC CLOUD ISN'T SECURE

Hyperscaler security is robust, reliable, proven—and more secure than a telco data center. The Big Three hyperscalers (AWS, Azure, Google Cloud) have layers of security in their data centers, custom chips and hardware built to prevent internal attacks (like Google's purpose-built servers equipped with its custom-built Titan chip), and experience withstanding years of the world's best attackers trying to penetrate their defenses. (Remember Google's stop of the largest DDoS attack earlier this

> The public cloud is a genuine threat to tens of thousands of jobs, and that truth can be very uncomfortable for employees and managers alike.

year?) Plus, the Big Three have committed $150 BILLION to spend on additional security, on top of the billions they already spend. Telco data center security can't come close to matching these resources and know-how.

So why does this myth persist? Mostly because of a lack of knowledge. I always encourage telco executives to spend some time with hyperscaler security experts to understand how the public cloud security model works, just like they would need to do in their own data centers. Once you start your journey, remember that hyperscalers have hundreds and hundreds of cybersecurity experts ready to help you get it right. Moving to the public cloud will enhance the security of your network and your data, and provide greater protection for your end-users.

MYTH #2: THE PUBLIC CLOUD IS MORE EXPENSIVE

If this is your experience, you're doing something wrong. If you're planning to move applications to the public cloud as-is—also known as the "lift and shift" method—and leave them unchanged, then yes, it will be WAY more expensive. You might as well leave the applications on-premise because you won't get the benefits of the public cloud.

So how can telco save a ton of money with a move to the public cloud? By redesigning and refactoring applications to make them public cloud native. For example, replace expensive on-prem Oracle databases with a cloud database like Aurora; or redesign a compute intensive application to be serverless. Once you rethink the way you're deploying applications, you'll realize the boatloads you can save.

MYTH #3: PRIVATE CLOUDS ARE THE SAME AS THE PUBLIC CLOUD

Every time I hear that a telco has chosen to build or maintain a private cloud, I mentally add five years to its public cloud journey. Don't be fooled by vendors that tell you it's the same; that couldn't be further from the truth. To build a private cloud, you will need to spend significant CapEx money on the hardware, and with every server you buy, your finance team is going to want to squeeze every last ounce of use from it to maximize the investment. Private cloud will also lock you into thousands of tiny tech decisions that need to be managed. Which container system shall we use? What's about orchestration? Shall we support one database stack, or three? How often should we upgrade the hardware? These decisions will become a distraction for your IT team members, and they come at the expense of using their time to support business growth and customers.

Public clouds really are different from private clouds. Once you look past the always-up-to-date hardware and custom silicon chips that are faster and cheaper, you'll realize all the software innovation the hyperscalers provide—analytics, machine learning, artificial intelligence, call center, sentiment analysis, and more. To add software like this to your private cloud, you'd have to build it yourself, or buy another package. In the public cloud, it's an API call away, charged by the use. THIS is something that truly sets the public cloud apart.

A REAL REASON SOME TELCOS ARE SLOW TO MOVE

I suspect these myths have persisted in telco because of a different, more personal opposition to the public cloud: fear of the impact to people. What I'm talking about here is jobs. This is a real issue. The public cloud is a genuine threat to tens of thousands of jobs, and that truth can be very uncomfortable for employees and managers alike. IT professionals will ask what this change means for them personally, and telco leaders need to address this concern head on. It's true that some people will leave your organization, but those who embrace training and get hands-on experience with the public cloud usually see a 30-40% increase in salary. And being part of a massive transformation project will add valuable, in-demand experience to anyone's CV.

It's time to set aside unfounded myths and unwarranted fears. Get the facts about the game-changing potential of the public cloud for telco. If you want to know more, get in touch! I love helping telcos with digital transformation. All aboard the public cloud train!

Danielle Royston is Founder and CEO of TelcoDR and the acting CEO of Totogi
feedbackvnd@cybermedia.co.in

Evolution of Edge Computing and its impact on data centres

Edge computing finds use cases in industries ranging from automobile to cloud gaming. All driverless vehicles on the road utilise edge computing

Global digitisation has brought about massive data growth across all industries. According to Statista, the total amount of data generated, computed, and analysed is projected to grow to more than 180 zettabytes by 2025. With the advent of 5G technologies, the business models of most economies are likely to change. Smartphones and ultra-high-speed internet connectivity will facilitate faster local data collection and drive more people to digital or IoT-based decision-making. However, conveying such a high volume of data to centralised hyper-scale data centres will enhance the latency and inefficiencies in the data processing. Thus, edge computing architectures are increasingly being set up to process and analyse data where they are generated.

WHAT IS EDGE COMPUTING?

In Industry 4.0, edge computing has evolved as a computational framework that supports the collection, storage, and processing of data at the periphery of the network. Edge data centres gather data from endpoints and process it immediately within the same environment without resorting to centralised data computing services. This boosts business performance, reduces operational costs, and facilitates reliability and resiliency. Businesses leveraging edge computing can make faster decisions depending on the local demand and supply requirements and purchase analysis.

Edge computing finds use cases in industries ranging from automobile to cloud gaming. All driverless vehicles on the road utilise edge computing AI programs and are trained using data centre ML models. Local data processing on mobile edge computing offers a faster and true-to-life gaming experience. Sensors and IoT devices connected to an edge platform in factories and plants can monitor real-time energy consumption and predict the maintenance of machines. Content like music, video streams, and web pages can be delivered with flexibility and next-zero buffering, improving latency and user experience. With

> Businesses leveraging edge computing can make faster decisions depending on the local demand and supply requirements and purchase analysis.

the growing adoption of IoT across industries and the evolving fifth-generation technology, the edge data centre market size is expected to grow from $7.2 billion in 2021 to $19.1 billion by 2026 at a CAGR of 21.4%.

FACTORS AFFECTING THE EVOLUTION OF EDGE DATA CENTRES IN INDIA

Industries during the COVID-19 pandemic have witnessed a shift to extended reality technologies like IoT, AR, VR, and AI. Users increasingly look to leverage the advantages of field service solutions, boosting the adoption of edge data centres across industry verticals. While India moves through a technological revolution, the following factors will affect the evolution of data centres from the count of 138 in 2022 to 183 by 2025.

IOT ADOPTION

India has 744 million smartphone users and is forecast to reach 1.5 billion by 2040. The exponential growth of internet infrastructure has shifted business models to an inclusive digital economy, with a vast amount of data being generated in the form of texts, images, audio, and videos. Transmitting the collected data to the central ecosystem and retrieving processed outcomes to the endpoints would increase network latency and result in an industry slowdown.

Edge DCs process a more significant percentage of data too close to the end-users to facilitate technologies like IoT, blockchain content delivery networks, real-time video streaming, real-time video analytics, and interactive gaming. They support connected factories, smart cities, multi-party video conferencing, smart homes, and online shopping with ultra-low latency and reduced operational costs. Cloud-based business processes like the ERP and supply chain tools require edge computing to connect across different geographical locations and communicate through the multi-cloud.

5G SERVICES

India's 5G rollout will witness a 100x increase in traffic capacity and network efficiency, raising bandwidth constraints, latency concerns, and unprecedented network disruptions at traditional data centres. Edge computing may combat such challenges with faster response times, deeper insights, and enhanced consumer experiences. The user-centric infrastructure analyses enormous data on-site in near real-time, integrating new-age technologies and facilitating a $9.28 billion IoT market by 2025.

HOW WILL THE DEPLOYMENT OF EDGE SOLUTIONS BOOST THE INDUSTRY?

Since micro data centres are deployed far outside the core data processing units, edge computing infrastructures should be more scalable, efficient, self-healing, and reliable. They need advanced security against sophisticated threats like lateral attacks, account theft, entitlement theft, DDoS attacks, and data sprawl. Thus, edge centre solutions should include the required physical infrastructure to support, power, cool, secure, and monitor the IT environment. These highly standardised items provide greater adaptability and scalability based on needs and constraints.

Leading Data Centre Infrastructure Solutions offer integrated power distribution through UPS, power distribution cabinets, and management units for eco-friendly data rooms. Their high-efficiency components can be assembled easily with modular server racks and accessories. The optimised installation and operation costs of the power devices facilitate enterprise growth with enhanced scalability. Moreover, advanced precision cooling and energy-saving components aim to save more than 25% of energy and offer a robust environment-management system with greater data centre security.

FINAL WORDS

With digital transformation, the availability of local edge computing sites is gaining importance for business continuity. More than 102 edge data centres are likely to be established in rural and semi-urban regions of India to roll out 5G services and bridge the digital divide. However, the challenges of edge centres regarding infrastructure and data security must be addressed with state-of-the-art solutions to meet user demands. With integrated power management solutions and scalable components, edge centres will contribute significantly to the 2,200 thousand square feet data centre market by 2027.

Deepak Thakur is the Business Head of MCIS Solutions, Delta Electronics India.
feedbackvnd@cybermedia.co.in

Saurabh Kumar Sahu
MD & Lead – Communications,
Media and Technology, Accenture in India

"How Telcos can leverage the Metaverse Continuum Opportunity"

In an Email Q&A with Voice & Data, ***Saurabh Kumar Sahu****, MD & Lead – Communications, Media and Technology, Accenture in India, discusses the opportunities, trends that Metaverse presents, and how Telcos can leverage the Metaverse Continuum Opportunity.*

HOW DO YOU SEE THE ROLE OF TELCOS EVOLVING IN THE CONTEXT OF METAVERSE?

The metaverse is a continuum of emerging capabilities, technologies and experiences that applies across all aspects of business – from virtual to reality, consumer to worker and from the world of cloud and artificial intelligence to extended reality, blockchain, digital twins and edge technologies. The expansion of the metaverse is pushing industries, including the telecom sector, to extend from solely physical presence to fully or hybrid digital ecosystems. 5G with its superior speed and ultra-low latency benefits combined with the latest technologies, will be a key enabler of the metaverse. Telcos through their networks and large subscriber base, are strongly positioned to capitalize on the significant market opportunity (estimated by Citi to be $13trn by 2030) in the metaverse.

Not only is the next-gen connectivity that telcos provide critically important to the success of new experiences in the metaverse, but the strategies telcos make to evolve or revolutionize their business will be essential to their future success. We see three potential roles emerging for telcos in this new virtual environment — the Disruptor (focusing on developing new services, experiences, and platforms), the Orchestrator (focused on developing the enabling capabilities for the metaverse, example identity, payments and trust) and the Performance Player (focused on building and running metaverse ready networks). These roles define paths to purpose-driven growth.

WHAT ARE THE OPPORTUNITIES FOR TELCOS WITH THE ADVENT OF METAVERSE AND WEB3?

With the metaverse and web3, telcos have an opportunity to play a crucial role in shaping and defining the next digital era. Telcos can benefit immensely from this next evolution of the internet, as it can become a formula to obtain income from the 5G network that they are deploying. web3 will provide an opportunity for telcos to transform their role in the technology ecosystem beyond traditional connectivity. In the future, telcos can use distributed ledger technology with digital technologies such as edge computing, Artificial Intelligence (AI), digital twins, and hybrid cloud platforms to build new business models and operational approaches. However, to take advantage of these opportunities, telcos need to re-evaluate their own online presence and work on using these technologies to connect better with customers, partners and their own workforce.

New technologies like the metaverse and 5G also raise expectations for digital and connectivity conveniences. Telcos will need a deep understanding of the changing technology landscape and shifts in consumer behaviour and expectations. While we focus on the positive opportunities that these developments will bring along, it is known that more interconnectivity increases security and privacy threats. Telcos can take this opportunity to capitalize on their high levels of consumer trust to provide secure and authentic communications across industries in the metaverse.

WHAT ARE THE TOP TECHNOLOGY TRENDS THAT TELCOS CAN LEVERAGE TO REDEFINE OUR DIGITAL FUTURE?

5G is designed to maximize advantages from emerging technology trends that helps a telco become end to end solutions provider beyond just trusted provider of

> According to an industry estimate, 5G will enable Indian mobile service providers to generate USD 17 billion in incremental revenue from enterprises by 2030.

connectivity. 5G network virtualization and cloudification are two top technology trends that can both create a next generation network and redefine our digital future. Previous network generations used equipment that included tightly integrated hardware, software, tools and services. But now there are more and more software defined networks (SDN) that disaggregate the hardware from software creating more options in the network value chain in terms of better economics, ease of scalability, quicker time to market, higher flexibility in working with ecosystem partners and new business models. But building this next generation network is just the beginning, there is still a need to roll it out quickly and customize with a network slice of the public network or through a Private Cellular Network. Also, having this 5G next generation network enabled key technologies will accelerate digital transformation with synergistic technology trends, such as: AI/ML for network automation, edge to bring computing physically closer to where the data is created and extended reality (e.g. Virtual Readily, Augmented Reality, Mixed Reality) to drive the Metaverse and create new B2C and B2B solutions. Finally, 5G is designed with in-built security to ensure peace of mind for the users with sensitive business and personal data.

HOW CAN TELCOS BECOME SUSTAINABILITY STEWARDS – FOR THE INDUSTRY AND BEYOND?

According to an Accenture research, despite an 8x increase in data traffic, operational emissions from the information and communications technology (ICT) sector could remain flat, and if the potential impact of Power Purchasing Agreements (PPAs) and Renewable Energy Certificates (RECs) are included, operational emissions across mobile networks, fixed networks, and datacentres could decrease by nearly 40% by 2030. That is because telcos are well positioned to pioneer sustainability in their operations, being aligned to enterprises across industries, billions of customers, and a network of suppliers.

Telcos can leverage a "data driven green network transformation" via green benchmarks data from our crowdsourced data and calibrated via predictive analytics and other advanced tools to optimise energy usage whilst maintaining customer satisfactions. This would not over-power network, for example during night time, non-peak times to optimal performance per gigawatt. Accenture provide this "holistic" end to end operations view managing the network, site and operations including data centers to drive energy efficiency, carbon reduction and network opex efficiency.

In green operations we support retiring legacy, low-efficiency components, and transitioning to renewable energy sources. For example, the Radio Access Network (RAN) can play a key role in this transition to lower emissions in network operations by reducing down-time in the network, resiliency initiatives make a significant contribution to reduction in emissions and network optimization with AI can enable telcos to qualify the impact of extreme weather risk on network assets, plan the potential response, and proactively harden the network.

WITH THE LAUNCH OF 5G IN INDIA, HOW DO YOU SEE ADOPTION SCALING?

India has been on a steady progressive path to adopt 5G and multitude of new consumer and business cases unleashed by 5G around manufacturing, entertainment, healthcare, retail, energy, transportation may play a key role in accelerating India's key goals towards growth, sustainability, job creation and competitiveness. Telcos have been developing the necessary ecosystem to help accelerate its adoption. This involves setting up innovation centres and labs to test next generation network integration and innovation use cases. We strongly believe 5G will play a disruptive role for enterprises as it has the potential to create new products, services, and revenue streams, while delivering cost and productivity benefits and supporting sustainability and resiliency. According to an industry estimate, 5G will enable Indian mobile service providers to generate USD 17 billion in incremental revenue from enterprises by 2030. To scale its adoption at an enterprise level new partnerships and collaboration models need to be established by telcos with other industry sectors. Skilling will also play a critical role in its adoption. As 5G enabled smartphone prices reduce, we expect wider adoption of 5G in the next two to three years in the consumer segment.

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Digital Infrastructure Services – Trends That Matter!

Many trends will shape the future of India's digital infrastructure and services industry. Here are my picks

BY RAJ SETHIA

The digital eco-system is critical for India's long-term and equitable socio-economic growth, as well as its goal of becoming a developed nation by 2047.

Important enablers of the country's overarching Digital India program, such as the Department of Telecommunications ("DOT"), government bodies, mobile network operators ("MNOs"), Internet Service Providers ("ISPs"), handset makers, big tech companies, and successful and promising start-ups, deserve the recognition and attention they are receiving. However, despite being crucial bedrock for the Program's success, the less glamorous Digital Infrastructure ("DI") industry inadvertently misses the spotlight.

This sector too, is amid an exciting transformation all over the world and in India and will have a defining role to play building India's digital future.

Many trends will shape the future of India's digital infrastructure and services industry. Here are my picks that will have a significant, and in many cases disruptive, impact on all infrastructure, system integration, and managed service providers. Each one will write its success story based on the response they choose to have for each of them.

THE DEFINING DRIFT

Business models will be recrafted

The legacy commercial model, built around the troika of passive infra hosting, tenancy ratio, and site & energy management services will have to be reinvented.

> The legacy commercial model, built around the troika of passive infra hosting, tenancy ratio, and site & energy management services will have to be reinvented.

Unless solved through disruptive business models and legislative mandates, ubiquitous, high-quality 4G and 5G based indoor coverage will remain a pipe dream and a multi-faceted commercial challenge on the ground.

The DI firms will create disproportionate shareholder value by implementing innovative models and layering newer planning, deployment, operations, and

> With increasing criticality and dependence, customers will expect greater accountability, control, and visibility into network performance, security, and quality.

management support services across a tech-agnostic access infrastructure network.

Densified outdoors, and low latency indoors will define the next wave of the Digital Infrastructure investments

Notwithstanding the technology used, latency KPIs (Key Performance Indicators) will become increasingly important.

Policy reforms, and regulatory winds will continue to help improve the economics of Digital Infrastructure

More specifically for the DIs, frameworks will eventually appear that will:

- Diminish the "rent-seeking" power of ROW authorities and venue owners, and normalise building neutral-host, indoor digital infrastructure as a prerequisite for the go-live of any real-estate project
- Sharing of infrastructure including active sharing will be further encouraged through policy nudge

While granting right-of-way ("ROW") for mobile infrastructure, a sizable number of owners of important and premium indoor and dense outdoor real-estate, will have to shift from a "rent-seeker" mindset to that of a "service-enabling-stakeholder". Their reduced bargaining power, consumer and tenant pressure, and government mandates will bring about (or will ensure) this transformation.

> In the foreseeable future, meta-verse applications like extreme gaming, AR/VR etc., will drive Wi-Fi NAAS as much as 5G and Private-LTE growth.

The government and the DOT have already taken significant steps, such as setting up the Gati Shakti Sanchar Portal and amending the Indian Telegraph ROW Rules 2016. They are also developing frameworks to ensure mandatory digital connectivity in buildings and the widespread use of street furniture in 5G deployment. The DOT is also looking into ways to encourage infrastructure sharing among operators, possibly through a modified license regime, by broadening the scope of the IP-1 registration. Collectively, these efforts along with some promising technology and commercial breakthroughs in the Original Equipment Manufacturers ("OEM") world, will significantly improve the efficiency as well as economics of digital infrastructure deployment, in general, and indoor and dense-outdoor infrastructure deployment in particular.

The tilt towards use-case, applications, and Quality of Service ("QOS") focused offerings will increase.
With increasing criticality and dependence, customers will expect greater accountability, control, and visibility into network performance, security, and quality.

There will be greater support for "As-A-Service" models in general
There are four big reasons for this – Cost, Complexity, Control, and Competence.

Wireless gigabit backhaul technologies as well as Fixed Wireless Access ("FWA") will become mature, widespread
This will create new opportunities and adjacencies for DI companies.

DI companies of tomorrow will have the engineering smarts.
They will understand infrastructure and service delivery imperatives of Cloud, Edge, IOT (Internet of Things), AI/ML, and Analytics-based hardware and software solutions. They will also master skills to deploy support and manage deployments and operations with varying mix and degree of latency, speed, capacity, security, and reliability thresholds.

The emergent heterogeneous, unified, multi-use, and more mission-critical network deployments will need sharing and ownership of a broader set of responsibilities, skill sets, and capabilities, with commensurate revenue upsides for everyone in the delivery value chain.

Low Powered Small Cells ("LPSC") will gain traction for indoor coverage and capacity, with vastly improved economics.
As a corollary, traditional passive and hybrid IBS-DAS models will gradually become more niche and cede some space to LPSCs, while also competing with Multi-Operator RAN (Radio Access Network) deployments.

Wi-Fi Network as a Service ("NAAS") will continue to find favour and grow due to rapid advancements in Wi-Fi standards, potential increase in unlicensed spectrum capacity (6 GHz band in line with global regulatory trends), and growing number of indoor low latency uses
In the foreseeable future, meta-verse applications like extreme gaming, AR/VR etc., will drive Wi-Fi NAAS as much as 5G and Private-LTE growth. This will be due to relative economic benefits in many non-critical use cases, rapid improvements in the standards and feature sets, and the fast-maturing Open Wi-Fi eco-system.

CONCLUSION

India aims to leapfrog into the thought leadership space in all-things-digital and the aspirations are backed with its success in the recent past and potential that lies ahead. For this, the industry must ensure that its infrastructure and services are ready to support modern technologies, novel services, and new business models.

This will now need a generational shift in thinking, disruptive interventions, and absolute clarity in the minds of all stakeholders including the DOT about how future digital infrastructure services should be upgraded or created; packaged and bundled; delivered and managed. At-scale. And at terrific value for the customer.

PS: I am time-stamping this article. Let's review it again in four to six quarters from now!

Raj Sethia founded and currently leads FireFly Networks Limited.
feedbackvnd@cybermedia.co.in

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RANKING OF TOP 100 ENGINEERING COLLEGES IN INDIA ON "DIGITAL INDEX"

December 2022 edition

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This December, Dataquest is coming up with the market analysis of the higher education sector primarily engineering colleges in India on basis of Digital Index". Digital indexing will evaluate the overall **"DIGITAL INFRASTRUCTURE, DIGITAL TEACHING & LEARNING PRACTICES, ADOPTING NEW TECHNOLOGIES, NEW AGE SKILL DEVELOPMENT & SUPPORT, ATTRIBUTING NEW DIGITAL CULTURES** among students & teachers.

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Universal connectivity should be the birth right for all in wireless world of the future

BY PRADEEP CHAKRABORTY

Delivering the keynote, Sunil Bharti Mittal, Executive Chairman, OneWeb, presented the wireless world of the future. He said that we have regulators and policy makers who hold an important position in the ecosystem. One of the most difficult challenges for us is to connect the unconnected. We have not been able to still connect a lot of people. Large number of people still don't have connection to high-speed broadband. We now have a ray of hope from satellite communications. Universal connectivity should be the birth right for all.

OneWeb has brought to life high-speed low-earth orbit (LEO) connectivity with low latency for primary, back-up, and hybrid capabilities. It delivers digital products and flexible plans that easily integrate with existing networks.

OneWeb and SpaceX entered into an agreement in March 2022 that will enable OneWeb to resume satellite launches. OneWeb, along with Starlink, is providing LEO services.

OneWeb took $229.2 million hit after it cancelled launches from Russia's Baikonur facility, and a number of its LEO satellites waiting to be sent to space were not returned. Mittal said we had a setback as the launches in Russia were compromised. We have overcome that.

In October, 36 OneWeb satellites were successfully launched by ISRO/ NSIL from Sriharikota, India. All of the 36 satellites are operational, bringing OneWeb's total Gen 1 LEO constellation to 462 satellites. SpaceX will also launch 40 satellites for OneWeb. We are providing services to high-gain enterprise customers. Satellite connectivity has been something that the industry has been waiting for a long time, and it is now in play. Next, collaboration has been the one buzzword to connect the unconnected.

He invited Africa to take on LEOs, if they so wish. They can provide any services that they want. There will also be some space-faring nations, such as USA, China, Russia, and even India. Another region coming up is Saudi Arabia.

OneWeb now has about 500 satellites. With four more launches to go, OneWeb remains on track to activate global coverage in 2023. He added that we will have 45 SMPS around the globe, of which 26 will be done this year. We are also getting user terminals. We have nearly 1.1Tbps capacity to serve the world. The power of the LEO constellation is enormous. We have been present in Saudi Arabia for some time. We have partnerships with Neom and STC.

Neom's next-generation cognitive cities will support cutting-edge urban environments, improving the lives of residents and businesses far beyond the capabilities of today's smart cities. STC will deliver an advanced 5G and IoT network to support the development of Neom. Neom Tech & Digital Holding Co. – the first holding company to be established as a subsidiary of Neom – and OneWeb signed a $200 million (SAR 750 million) JV agreement to bring high-speed satellite connectivity to Neom, Saudi Arabia and wider Middle East, and neighboring East African countries.


Sunil Mittal, OneWeb

Mittal said that we are also bringing satellite services to Africa. We are connecting thousands of schools in Africa. Going forward, there must be very high degree of co-operation among space-faring nations. We intend to put LEO and GEO capabilities together. It will be world's first combination of LEO and GEO satellites. Intelsat and OneWeb have already partnered on the LEO/GEO in-flight connectivity. Eutelsat and OneWeb also see big future for combined GEO/LEO offering.

France and UK are two shareholders of OneWeb. Saudi Arabia is in discussion, and so is India. Mittal concluded that we are very excited to provide connectivity to Saudi Arabia. OneWeb should also finish the job of connecting everyone in the world by 2030.

Meta's India employees anxious as 11,000 employees laid off globally

India employees of Meta, the firm that owns Facebook, Instagram and WhatsApp, have been thrown off-guard after the US firm announced 11,000 layoffs globally or 13 per cent of its workforce.

While no country-specific numbers have yet been disclosed, Meta's India staff are looking for clues on their future.

Company officials went incommunicado soon after Meta CEO Mark Zuckerberg made public a letter he had written to employees announcing the job cuts.

Meta's rival Twitter had just last week fired more than 90 per cent of its just over 200 India staff as part of a global reduction by new owner Elon Musk.

To handle multiple operations for Facebook, WhatsApp and Instagram, Meta has an estimated 300-400 employees in India. The smallest team of 60-plus is with WhatsApp.

India is a key growth engine for Meta Platforms Ltd, Twitter, Alphabet Inc's Google and other global internet companies.

These firms reaped a financial boost during the Covid pandemic lockdown era because more people stayed home and scrolled on their phones and computers. But firms are now faced with a rising in interest rates, which has increased outgo on the money they borrowed for expansions. This together with a grim outlook for online advertising amid an economic slowdown has added to their woes.

This summer, Meta posted its first quarterly revenue decline in history, followed by another, bigger decline in the fall.

According to Musk, Twitter is losing USD 4 million per day.

US-based companies, including many tech firms, have cumulatively laid off thousands of employees in 2022 alone and slammed the brakes on hiring. The storm clouds over the global economy have prompted economic commentators to flash warnings about recession risks up ahead and international market shocks.

"We are not providing details on specific team impact," Meta India said in response to an email seeking comments on country-specific impact.

Earlier this month, Meta India head Ajit Mohan resigned from the company to join rival Snap from February.

"Ajit has decided to step down from his role at Meta to pursue another opportunity outside of the company. Over the last four years, he has played an important role in shaping and scaling our India operations so they can serve many millions of Indian businesses, partners and people," Meta's Global Business Group Vice

President Nicola Mendelsohn had said in a statement on November 3.

Mohan, who resigned with immediate effect, had joined Meta which was earlier known as Facebook in January 2019 from Hotstar.

Mohan's resignation in fact came within a week of the government notifying stringent norms under the IT Act for social media platforms.

"Today, I'm sharing some of the most difficult changes we've made in Meta's history. I've decided to reduce the size of our team by about 13 pr cent and let more than 11,000 of our talented employees go," Zuckerberg said in a letter to employees.

The government recently notified rules under which it will set up appellate panels to redress grievances that users may have against decisions of social media platforms like Twitter and Facebook on hosting contentious content.

Minister of Electronics and IT Rajeev Chandrasekhar had said the move to form three-member Grievance Appellate Committees (GACs) was necessitated as the government has information that there were lakhs of messages from citizens where grievances were not responded to by social media firms despite complaints.

There will be one government member and two independent members in these committees.

During Mohan's tenure, Facebook came under sharp criticism for allegedly favouring ruling party leaders on the platform. The controversy followed the resignation of Facebook's then policy head Ankhi Das in October 2020.

India is one of the biggest markets for digital platforms like Facebook, WhatsApp, Google and Twitter. As per data cited by the government last year, the country has 53 crore WhatsApp users, 44.8 crore YouTube users, 41 crore Facebook users, while 21 crore use Instagram and 1.75 crore are on Twitter. (PTI Report)

Reliance Jio rolls-out 5G services in Bengaluru and Hyderabad

Jio has expanded its 5G network, Jio True 5G to Bengaluru in an effort to enable the city tap into the full potential of the most cutting-edge technology that will benefit citizens and enhance the standard of living for Bangaloreans, according to a statement from the business.

With the advent of 5G, Jio users will be able to smoothly access networks with speeds between 500 Mbps and 1 Gbps. According to Reliance Jio Infocomm, it offered a 5G infrastructure and network that was independent of the 4G network and was independent of advanced 5G architecture.

According to the firm, Jio customers in Bangalore will be given the opportunity to take advantage of a free welcome 5G offer that will provide them unlimited access to data at speeds ranging up to 1 Gbps.

Requesting a Jio 5G invitation, for Hyderabad and Bengaluru Customers

To receive the invitation from the corporation, Jio consumers must first have the Rs 239 plan or above recharge done, following which Jio's 5G service must be supported by your device, else, it won't function for you.

Reliance Jio's 5G network services are only available to customers who have been invited by the telco in Hyderabad and Bengaluru. The 5G standalone(SA) networks offered by Jio are now in beta testing and are free for users to use. Customers may receive it free from Jio and enjoy hassle-free 5G.

Reliance Jio's 5G network services are only available to customers who have been invited by the telco in Hyderabad and Bengaluru. The 5G standalone(SA) networks offered by Jio are now in beta testing and are free for users to use.

The following cities now have access to Jio's mobile 5G service; Delhi, Mumbai, Kolkata, Hyderabad, Chennai, Bangalore and Varanasi. Additionally there is 5G-enabled Wi-Fi provided by Jio in Nathdwara, not a mobile network.

DoT publishes regulations for administratively allocated spectrum surrender

The Department of Telecommunications (DoT) has ruled that organisations must alert the government 30 to 60 days prior to the anticipated date of administratively assigned spectrum surrender.

According to the Friday-released guidelines for surrendering administratively allocated spectrum with access service authorization, the DoT stated that companies should give notice not earlier than 60 days and not later than 30 days prior to the surrender date.

In accordance with the guidelines, the applicant corporation must additionally submit a certified copy of any spectrum charges that have been paid as of the application date for the prior quarter, either on a provisional/final assessments basis or on a self-assessment basis. Substantive charges may be excluded.

According to the regulations, any business that wants to give up administratively assigned spectrum, such as GSM, CDMA, MW access, and MW backbone, must notify the DoT between 30 to 60 days before the proposed surrender date. The notification to the DoT must be made no earlier than 60 days and no later than 30 days prior to the surrender date, said DoT.

From the actual date of surrender, per process, the given spectrum can be made available for future assignment to any telco. Additionally, the technology utilised in the abandoned spectrum can be applied elsewhere.

Within 30 calendar days of receiving the application, the WPC (wireless planning & coordination) division of the DoT must send the relevant letter to the applicant company.

Government instructions for returning spectrum purchased through the 5G auction after ten years from the purchase date were published earlier in June.

BSNL receives a nod from the government to give TCS a 4G order

The government has given Bharat Sanchar Nigam Limited (BSNL) the go-ahead to award Tata Consultancy Services(TCS) the 4G contract or order for 4G upgrade. The 4G PoC (Proof of concept) tests with the TCS-led consortium, which also includes the Centre for Development of Telematics (C-DoT) , Tejas Networks, and others were previously finished by BSNL.

The government has now given BSNL the go-ahead to complete the 4G upgrade agreement with TCS. The state-run telco can move through with an order of Rs 26,821 crore as stated by an ET Telecom report.

Over 100,000 locations across the country will be upgraded with the assistance of the IT major.

According to the report, TCS would be in charge of managing and maintaining the network for the following nine years. By January 2023, BSNL is anticipated to establish its own 4G networks. Currently, there are roughly 111 million users to the state-run telco. Since the BSNL pricing are so reasonable, the numbers should increase once the 4G rollout occurs on a large scale.

According to the agreement, Tejas Networks will be in charge of providing the hardware for the 4G rollout and TCS will serve as a systems integrator. Within a year of the purchase order, TCS will provide BSNL with the entirety of the core equipment. It would take up to 18 t 24 months to supply the radio equipment.

> Tejas Networks will be in charge of providing the hardware for the 4G rollout and TCS will serve as a systems integrator.

It would be reasonable to predict that BSNL will need another 2 years to implement 4G on a large scale in India. But the telco can move forward with the 5G non-standalone(NSA) deployment as soon as it offers 4G in significant metro areas. It can proceed as soon as the commercial agreement between BSNL and TCS is finalised, and India will then finally get domestic 4G from BSNL.

Nokia introduces Core SaaS for 5G

Nokia, a Finnish manufacturer of telecommunications equipment, unveiled its Core Software-as-a-Service for 5G today.

Trials are anticipated to begin soon, and commercial availability is anticipated in the first half of 2023, it was stated.

In a statement, Nokia claimed that its software service eliminates significant up-front capital expenditure. "Nokia Core SaaS allows operators and enterprises to move away from the legacy practice of deploying customized software that runs on private infrastructure and to consume Nokia's Core software including 5G Packet Core, on-demand through a more cost-effective subscription service," the company said.

With more than 70 customers worldwide, Nokia claims to be the market leader in 5G Standalone(SA) core, and 25 of the top 40 telecom firms by revenue rely on Nokia Core network equipment.

According to Fran Heeran, SVP & General Manager of Nokia's core Networks, cloud and network services,

"Nokia Core SaaS changes how core networks are built, deployed, and operated, with significant customer benefits including Network on demand, speed to market, and easy and fast scaling in an affordable way."

It adds a new level to telecom SaaS, according to Roberto Kompany, Principal Analyst, Service Provider Networks at Omdia, " Nokia's debut of its Core SaaS service through a subscription model today is a new dimension to telecom SaaS, and I would expect to see more of this through 2023," he added.

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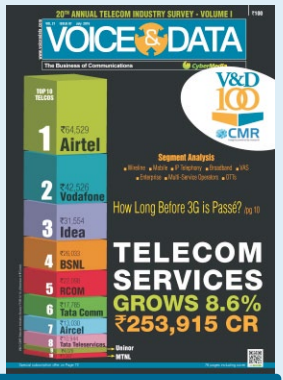

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Time-Sensitive Networking Enabling Industry 4.0

Industry 4.0 is currently under way, with massive machine-to-machine communication at its core, focused on manufacturing smart products in fully connected and optimized factory floors. Harnessing the power of IoT, cloud, big data, machine learning, artificial intelligence and automation, the integrated and intelligent use of processes and resources are creating immense efficiencies and opportunities, while transforming the economic and social landscape. Across the globe, manufacturing sector is witnessing unprecedented levels of agility and workflows. As per industry data, by 2028 the global Industry 4.0 market is set to touch US$337 billion.

Connected Machines and TSN

High availability plays a key role in smart manufacturing and for mission-critical Industry 4.0 applications there is no scope for even the smallest downtime. With advanced sensors, embedded software and robotics becoming part of intelligent manufacturing, organizations are rapidly changing the ways they produce and deliver their products. New technologies like; artificial intelligence, advanced automation and augmented/virtual reality are helping accelerate smart manufacturing, making factories more agile and efficient. With more time-sensitive applications used in smart manufacturing, traditional Ethernet is no longer sufficient to support these demands and TSN will play a critical role in enabling smart manufacturing, allowing the industry to overcome key challenges. In fact, Ethernet with TSN standards has become a critical component in advanced factories today.

Time-Sensitive Networking (TSN) is a set of IEEE standards that provides deterministic, highly reliable and low-latency communication over wired Ethernet. It is the technology of the future for convergent industrial communications and Industry 4.0. Interworking of the 5G system and the TSN system is a key objective in making the 5G system a better fit for future Industrial Internet of Things (IIoT) applications.

The Integrated Network

Ensuring time precision is not the only advantage that Ethernet with TSN standards has over its conventional counterpart. Ethernet with TSN standards supports different types of data traffic, which means different data streams can be merged, reducing the number of networks thereby simplifying backend processes. Also, an integrated network ensures greater visibility over the data generated across the entire manufacturing process. This data can be extracted and analysed, which in turn can help organizations optimise performance, productivity and efficiency. Moreover, an integrated network allows operators to easily identify and troubleshoot any potential issues. This not only reduces downtime arising due to maintenance or repair activities, but also keeps the production line running uninterrupted.

TSN over 5G systems bring numerous benefits to industrial communication networks. Both technologies have been designed to provide converged communication for a wide range of services on a common network infrastructure and significant benefits can be achieved for Industry 4.0 use cases by enabling TSN and 5G to work together.

Testing TSN standards in a simulated environment

TSN over 5G bring numerous benefits to industrial communication networks, however comprehensive testing must be performed to ensure all requirements are being met, both in the lab and in live networks. Testing TSN standards in a simulated environment has many benefits. Engineers can specify the exact parameters to test-run the entire manufacturing process. They could even push the system to its operational limits and observe its performance under stress. Operational errors can also be reproduced, to ascertain if a failure was random or caused by specific test conditions.

Every aspect of the network's behaviour, including the timing of data packet's transmission and reception, can be precisely measured at every stage of the production line. This allows technicians to perform finer, more precise calibrations, before the manufacturing process goes live. TSN simulation testing is important to assess the network's ability to handle peak traffic loads, as well as other operating scenarios.

Time to realize the full potential of TSN over 5G

TSN is evolving fast and it is important to test, measure and validate interoperability, performance, stability and reliability of TSN devices and networks with actionable analytics and intuitive reporting. TSN over 5G systems bring numerous benefits to industrial communication networks. Both technologies have been designed to provide converged communication for a wide range of services on a common network infrastructure and significant benefits can be achieved for Industry 4.0 use cases by enabling TSN and 5G to work together.

Authored By-C P Manoharan, Director of Business Development, APAC SOUTH, Spirent Communications

VIAVI and VMware announce testbed as a service for RAN Intelligent Controller Testing

Viavi Solutions today announced that it has signed a partnership agreement with VMware to drive standardized frameworks and metrics for RAN Intelligent Controller (RIC) testing. This testbed as a service will enable mobile operators to introduce programmability to the RAN and help accelerate the adoption of Open RAN.

The RIC is a cloud-native central component of an open and virtualized RAN network, enabling the optimization of RAN resources through analytic processing and adaptation recommendations. The RIC takes advantage of native and third-party xApps and rApps , microservice-based applications operating in near-real time (near-RT) and non-real-time (non-RT), respectively, to enable operators to automate and optimize RAN operations at scale to reduce the operator's total cost of ownership, and to introduce innovative new services.

According to VMware it is focused on attracting and collaborating with a vibrant ecosystem of partners to help its operator customers adopt Open RAN with complete confidence and VIAVI as per the business, has a comprehensive portfolio of Open RAN test solutions in the industry and plays a critical role in defining test processes in the O-RAN ALLIANCE and Telecom Infra Project (TIP).

"Open RAN, by definition, depends on strong collaboration to drive innovation, and that's a perfect way to think about this partnership between leaders in their respective fields," said Ian Langley, Senior Vice President and General Manager, Wireless Business, VIAVI. "The RIC represents a huge opportunity to the industry: Applying AI/ML techniques allows operators to simplify the management of complex 5G configurations and dynamically optimize the network to cater for new use cases, energy efficiency, and changing traffic patterns," he added.

The two companies will work together to demonstrate compliance with RIC-related requirements, assisting CSPs in validating the solution in the lab and scaling the solution to production. VIAVI TeraVM RIC Test and the VMware RIC will form a joint testbed as a service for testing, profiling, and validating third-party xApps and rApps. In addition to the framework, the two companies will work together to drive industry consensus around testing methodology and performance metrics. By having pre-built test cases and a standardized test method for the RIC and xApp/rApp, operators can reduce the time it takes to validate the solution in their lab, meaning they can move to a production environment faster.

Lakshmi Mandyam, vice president, Service Provider Product Management and Partner Ecosystem, VMware said,"We're excited to work with VIAVI on helping move the industry forward to accelerate the adoption of Open RAN, Our companies share a vision of what it will take to address the challenges hindering adoption by simplifying the path for CSPs to test, profile, and certify third-party xApps and rApps through a common framework. VIAVI's leadership in Open RAN testing and VMware's leadership in RIC make this an ideal collaboration."

DoT's decision to cancel NOCC fees to result in significant savings: BIF

The Department of Telecommunications' recent decisions to waive annual network operation & control centre (NOCC) feesThe Department of Telecommunications' recent decisions to waive annual network operation & control centre (NOCC) fees and remove the requirement for satellite antennae to undergo mandatory performance verification testing (MPVT) are expected to result in significant cost savings for satellite service providers and broadcasters, according to satellite and tech companies.

The Broadband India Forum (BIF) stated on Monday that the DoT's recent moves on NOCC charges and the elimination of MPVT charges, which opened the door for self-verification, will result in an estimated annual savings for the satellite and broadcast communication sectors of about Rs 120 crore, including all players who are liable to pay.

Up until recently, satellite transponder capacity rental required satcom companies to pay NOCC fees.

The charge, which was equal to Rs 21 lakh per transponder annually, was imposed irrespective of the satellite capacity or operating frequency range

The BIF includes major satellite players including Hughes, Inmarsat, and OneWeb, which is owned by the Bharti Group, as well as major IT companies like Tata Consultancy Services, Cisco, Amazon, Google, Microsoft, Meta, and Qualcomm.

The new satcom changes by the DoT, according to T V Ramachandran, president of the BIF, will increase the overall ease of doing business (EoDB) and the digital connectivity quotient, including the supply of internet to the most remote and inaccessible zones quickly and efficiently.

"The abolition of MPVT fees and the waiver of annual NOCC fees for both broadcasters and VSAT licensees will benefit the broadcast and satcoms industries and help roll out services affordably because there will be savings on the testing front," he added. The statement continued by saying that the DoT'scall to permit fully automated & online processing of all applications through the Saral Sanchar portal will improve ease of doing business.

The much anticipated Spacecom policy from India is anticipated to permit LEO (low earth orbit) and MEO (medium earth orbit) satellite constellations to operate there, opening the door for satellite companies to gain landing rights and establish regional gateways. LEO/ MEO constellations are now prohibited in India.

The Department of Space (DoS) and INSPACe's ongoing liberalisation programme, the upcoming Space Bill, the planned opening up of the space sector to increase the private sector's involvement in space activities, and other significant policy developments, according to Ramchandran, make the timing of the most recent satcom reforms significant.

The crucial GMPCS (global mobile personal communications by satellite services) licence has already been granted to OneWeb and Jio, while Starlink has just recently submitted an application to do the same for the introduction of internet-from-space services in India.

In India's still-emerging broadband-from space services market, which is projected to be worth $13 billion by 2025, competition has increased. Many companies are attempting to introduce satellite broadband services in India, including Reliance Jio, Bharti backed OneWeb, Nelco of the Tata Group, Elon Musk's Starlink, and Telesat of Canada.

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MediaTek launches its latest 5G chipset, Dimensity 9200

MediaTek today launched the Dimensity 9200, its latest 5G chipset powering the next era of flagship smartphones. Claiming extreme performance and intelligent power efficiency, the new SoC includes immersive all-day gaming experiences, ultra-sharp image capturing and support for both mmWave 5G and sub-6GHz connectivity to consumers around the globe.

"MediaTek's Dimensity 9200 combines ultimate performance with significant power savings, extending battery life and keeping smartphones cool," said JC Hsu, Corporate Vice President and General Manager of MediaTek's wireless communications business unit at MediaTek. "With notably brighter image capturing and improved gaming speeds, along with the latest display enhancements, the Dimensity 9200 will bring new possibilities for next-gen smartphones that come in a variety of stylish and foldable form factors," he added.

According to the company, the Dimensity 9200 is the first smartphone chip to integrate an Arm Cortex X3 with operating speeds over 3GHz, and the first featuring the Arm Immortalis-G715 GPU with a hardware-based ray tracing engine. The chipset also includes MediaTek's HyperEngine 6.0 Gaming Technology for fast, fluid action so that gamers can immerse themselves in every scene, in epic detail.

With focus on its power efficiency with its eXtreme Power Saving Technology for AI-noise reduction and AI-super resolution tasks, as per MediaTek, the Dimensity 9200 provides up to 30% power savings with AI-NR and 45% power savings with AI-SR in all visual applications. The chipset's sixth generation AI Processing Unit (APU 690) enhancements include up to 35% faster performance in ETHZ5.0 benchmark compared to the fifth generation APU.

The Dimensity 9200 is also claimed to be the first Wi-Fi 7-ready smartphone platform, supporting up to 6.5 Gbps data rates. The chipset integrates an advanced, built-in 5G modem with AI for faster network searching, 5G connection recovery out of dead zones, and other intelligent connectivity enhancements. It also delivers seamless 5G experiences by fluidly switching between long-reach sub-6GHz and super-fast mmWave connections simultaneously, according to the company. Users can connect everywhere with MediaTek's Bluetooth and Wi-Fi coexistence technology, allowing Wi-Fi, Bluetooth low energy (LE) audio and wireless peripherals like gamepads to connect at the same time without interference. Additionally, the chipset's dual antenna system switches between extreme performance and ultra-low power antennas based on real-time user needs.

The chipset's Imagiq 890 image signal processor according to MediaTek, supports captivating capture, whether users are in low light, bright light, or anywhere in between. Sporting the first native support for RGBW sensors, smartphones powered by the Dimensity 9200 will be able to avoid Bayer conversion, providing up to 34% more power savings than competing solutions. Additionally, users can create better cinematic videos and enjoy superior AI motion unblur technology with MediaTek's AI-NR photo capture technology. For video captures, the Video Stream Engine fuses the chipset's APU and ISP; this allows device makers to add unique AI-video enhancements that are notably faster and more power efficient.

Other key features of the MediaTek Dimensity 9200 include:

- 2nd Generation TSMC 4nm process- 1x Arm Cortex-X3 at 3.05GHz, 3x Arm Cortex-A715 at 2.85GHz, and 4x Arm Cortex-A510 at 1.8GHz, optimized to improve power efficiency in combination with thermal package design that keeps smartphones cool.
- Cutting-edge display technology- Supports Full HD+ up to 240Hz, WHQD up to 144Hz and 5K (2.5Kx2) up to 60Hz, with adaptive refresh rate technology for a smooth user experience.
- AI visual semantic display- Optimizes picture quality with multi-person segmentation and multi-layer color management per scene.
- MediaTek AI-SR/MEMC- Provides best-in-class video streaming.
- MediaTek Smart Blulight Defender- Ensures a more comfortable viewing experience.
- Bluetooth LE Audio-ready technology- Brings best-in-class audio latency with Dual-Link True Wireless Stereo Audio for incredible sound quality.
- LPDDR5X with support for up to 8533Mbps memory- Delivers the fastest smartphone memory.
- UFS 4.0 with Multi-Circular Queue (MCQ)- Provides each Cortex-A510 CPU core with direct access to storage, significantly boosting data transmission in multi-thread applications.

India set to witness multi-billion-dollar 5G infra roll-out

India is set to witness the world's largest roll-out of 5G infrastructure with multi-billion-dollar being spent by the country's leading telcos over the next several years, according to Syed Shahid Hussain, Managing Partner, Financial Services Sector, Asia Pacific, at IBM Consulting.

Additionally, the government is expected to lead in developing the India stack, a network building process that would cover every segment of the economy being digitised with the latest advanced technologies, he told PTI at the Singapore Fintech Festival last week, held from November 2-4, 2022.

"This is a big play," he said of the advanced technologies adoption in India, with IBM Consulting joining international technology groups participating in the large-scale development over several years through strategic partnerships with telcos such as Bharti Airtel and Reliance Group.

"We plan to work with Indian telcos, where we have strategic partnerships like Bharti Airtel to bring secured hybrid cloud services through the 5G network to national enterprises. The agreement with Bharti Airtel is there to launch it," said Shahid, the Singapore-based IBM executive. "For this, both the parties will have to spend billions of dollars. Huge amount of money is being spent by the stakeholders in this ongoing process and it will take over a couple of years," he underlined.

"We are particularly working on securing hybrid cloud services through the 5G network." Hybrid cloud is a major shift in the evolution of enterprise IT. The next big thing is to create India stack for different sectors of the Indian economy, he pointed out. India stack is a set of APIs that allows governments, businesses, startups and developers to utilise a unique digital infrastructure to solve India's hard problems towards presence-less, paperless and cashless service delivery.

Shahid says the government is to lead the India stack and incentivise banks and other stakeholders in the ecosystem for the benefits of consumers.

India has some 800 million mobile phone users and the number is growing, forming the base for the fast growing digital economy. On project basis, Shahid said IBM and Bank of Baroda will expand the 'Baroda Kisan' app, a one-stop shop for all the needs of the agriculture and farming community. It was launched in September 2019. Agriculture sector is a high priority area of development for the government which is committed to raising the income of farmers in the coming years. All the banks know that the traditional banking services will be different in four to five years down the line, he pointed out. Farmers, for example, will go to the platform which provides end-to-end services for the agriculture industry.

"We are trying to get all the stakeholders, on the three-year old Baroda Kisan platform, such as suppliers of fertilizers. With these stakeholders on board, price discovery can be better and farmers can go and buy from the best supplier," said the IIM Ahmedabad alumni.

In the future, the farmers' needs will be on apps and metaverse, making it easier and efficient to source services and supplies, even farm equipment. Another successful startup partnership by IBM in India is the SBI YONO (You Only Need One) app, valued at USD 40 billion. YONO gives SBI an enormous market advantage, combining services, products and features into one mobile app with a platform that could integrate data across third-party products and streamline the customer experience.

"These are two of the most successful startups by IBM and partners in India," said Shahid who has spent the first 15 years of his over 20 years' experience working in India. (PTI Report)

Vodafone Idea's Q2 loss expands to Rs 7,595.5 crore, shares down 1.4%

Due to a rise in finance and operating costs, Vodafone Idea's (Vi) net loss increased 6.4% year over year (YoY) to Rs 7,595 sequentially from Rs 7,296 crore. A day after its net loss for the fiscal second quarter of FY23, as it continued to experience significant subscriber losses, Vi's shares initially declined 1.4% on the BSE.

The business reported a net loss of Rs 7,132 crore over the comparable period in the previous year. On a consecutive basis, the net loss increased by 4%.

According to a not from ICICI Direct Research, "Vi's reported EBITDA margins were down 298 bps QoQ to 38.6%, below estimate of 41.4% owing to higher than anticipated network opex, which was up 16% QoQ and higher marketing expense.

Vi had faced a net loss of Rs 7,296 crore in the first quarter of FY23. Earnings before interest, tax, depreciation, and amortization (Ebitda), which measure a company's profitability, climbed by 6% to Rs 4,097 crore during the second quarter of FY23, while gross revenue jumped by 12.8% YoY to Rs 10,614 crore.

Its finance expenses increased 18.7% to Rs 6,033 crore while operational expenses rose 17.5% YoY to 6,517 crore. The average revenue per user (ARPU) increased to Rs 131 from Rs 128 in Q1 of FY23, an increase of 2.3% QoQ.

A few vendors have even requested immediate payment of past due amounts, and the company's ability to operate as a going concern depends on its ability to raise money and negotiate favorable terms with its suppliers.

As of right now, the group has paid off all of its debts, according to Vi.

At the end of the second quarter, the company's user base totaled 234.4 million, with a decrease of six million sequential users. Nevertheless, To 120.6 million, the 4G client base increased consecutively by 1.6 million.

Customers using 4G saw a sequential rise in data usage of 4.6% reaching 15 GB per month. Vi has been experiencing operational and financial difficulties, and earlier rating downgrades have raised the cost of borrowing money.

Due to freshly purchased spectrum, spectrum liabilities have increased, and Vi's bank debt has seen progressive decrease. Deffered spectrum Liabilities and bank borrowings made up the 2.2 trillion rupees in gross debt as of the end of September.

Vi chief executive officer Akshaya Moondra said in a statement that the business was in discussions with lenders and investors about additional finance raising for network development and the roll-out of 5G.

While Vi has not yet finalized its contracts for 5G network equipment, competing companies Airtel and Jio have already launched 5G services in the country.

More than Rs 4,900 crore has been invested by the the promoters of Vi, the Aditya Birla group and Vodafone Group Plc. According to Moondra, the business achieved revenue growth for a sixth straight quarter and an increase in 4G subscribers.

"We remain committed to increasing the capacity and coverage of our high-speed internet network. In order to improve our core and transmission networks and increase our 4G coverage capacity, we also keep refarming 2G and 3G spectrum," the business added.

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Bharti Airtel posts quarterly revenues of Rs 34,527 crore, up 21.9% YoY

Mobile services India revenues up 24.8% YoY, led by continued 4G customer addition Bharti Airtel Limited today announced its audited consolidated results for the second quarter ended September 30, 2022.

Q2'23 Performance: The consolidated revenues for Q2'23 at Rs 34,527 crore grew 21.9% YoY. Consolidated mobile data traffic at 13,232 PBs in the quarter with a YoY growth of 20.9%. India revenues for Q2'23 at Rs 24,333 crore, increased by 22.3% YoY. Mobile revenues grew by 24.8% YoY . ARPU for the quarter stood at Rs 190 as compared to Rs 153 in Q2'22 on the back of our continued focus on quality customers, feature phone to smartphone upgradation and data monetization.

According to Airtel's official statement, " we strengthened our leadership position in Postpaid segment with a customer base of 31.6 Mn (including IoT). We continue to gain strong share of the 4G customers in the market and added 17.8 Mn 4G data customers to our network over last year, an increase of 9.2% YoY. ARPU continues to be the best in industry, average data usage per data customer at 20.3 GBs/month and voice usage per customer at 1,082 mins /month.

Airtel reportedly rolled out additional 8 thousand towers in the quarter to further strengthen the network coverage and provide ubiquitous connectivity. Several initiatives have also claimed to be undertaken to improve Network quality – leveraging digital tools/probes to monitor and improve customer experience and scaling up Vo-Wi-Fi adoption to improve indoor experience. As per the report, Airtel now has over 47 Mn customers using their Vo-Wi-Fi services.

Post a successful spectrum auction and a quick and seamless allocation by DoT, the country witnessed the launch of 5G services by Prime Minister Narendra Modi at the IMC 2022. Airtel became the first telecom operator in India to roll out 5G services with a launch in 8 cities. Airtel mentioned in the report that, "Eventually we plan to cover all of urban and key rural areas of India by March 2024. Airtel 5G Plus promises to offer massive speeds, best voice experience, will work on all 5G smart phones and be kinder to the environment."

Homes business segment continues its strong momentum and delivers a revenue growth of 38.9% YoY, an outcome of continued acceleration on the back of growing need for reliable and consistent broadband in India. The report also stated, that Airtel added 417 K customers during the quarter to reach to a total base of 5.2 Mn and the company continues to accelerate our rollouts on the back of innovative asset light local cable

operator partnership model, and are now live in 1060 cities through this model.

Airtel Business continues its numero uno position with 16.8% YoY revenue growth. Revenue of Digital TV remained stable with customer base1 of 15.8 Mn at the end of the quarter. DTH business is showing early green shoots of recovery as an outcome of our strategy of simplifying pricing and offering converged propositions to win high value customers according to the company.

Company recorded robust customer base of over 190 Mn MAUs across our key digital assets – Thanks, Xstream and Wynk. In addition, Airtel also launched Airtel Xsafe – an advanced home surveillance solution which allows customer to keep an eye on loved ones.

According to the report, there are over 1.2 million retailers transacting and making payments every day on Mitra App. During the quarter, Airtel Payments Bank continued to expand rapidly with a strong total customer base of 151 Mn and highly engaged Monthly Transacting Users (MTU) base of over 50 Mn.

The report stated that, consolidated EBITDA witnessed an increase of 26.4% YoY to Rs 17,721 crore in Q2'23. This led to an improvement in EBITDA margin from 49.5% in Q2'22 to 51.3% in Q2'23 as we continue to focus on our War on Waste program to help fuel margin improvements. EBITDA margins across businesses remained healthy, with India mobile services EBITDA improving from 49.2% in Q2'22 to 52.4% in Q2'23.

Consolidated EBITDA increased by 52.2% YoY to Rs 8,762 crore. The Consolidated Net Income before exceptional items for the quarter stands at Rs 2,052 crore. The Consolidated Net income after exceptional items grew by 89.1% YoY to Rs 2,145 crore.

Airtel has paid 4 years of 2022 spectrum dues worth Rs 8312 crores. This upfront payment coupled with ongoing moratorium on spectrum dues and AGR will free up future cash flows and allow us to dedicate resources to drive 5G roll out. The Net Debt-EBITDA ratio (annualized) and including the impact of leases as on September 30, 2022 is at 2.96 times, same as corresponding quarter last year in spite of acquiring the 5G spectrum.

In a statement, Gopal Vittal, MD and CEO, India & South Asia, said: "We have delivered yet another quarter with competitive revenue growth and improved margins. Our consolidated revenue grew sequentially by 5.3% and EBITDA margin expanded to 51.3%. The consistency of our execution is driven by the strength and resilience of our portfolio. Our B2B and Homes business continued their strong growth momentum while Mobile ARPU expanded to 190 on the back of optimization and deep customer understanding."

'We are now rolling out 5G and are confident that Airtel 5G Plus will deliver the best experience in India while being kinder to the environment. I do believe that 5G technology has the potential of bringing tremendous innovation into India. At the same time we remain concerned about the low ROCE that our business delivers due to pricing that is the lowest in the world. Given the large investments required to drive digital adoption in India we believe there is a need for tariff correction," he further added.

iPhone users to receive 5G software beta update next week before wide rollout

A software update for iPhones is expected to be released next week to allow 5G capabilities for public beta testing before a wider rollout in December, according to the business.

Representatives from Apple, the manufacturers of iPhone are expected to meet with C-DoT, the Department of Telecommunications' research division to inform them on the public beta rollout.

The iOS beta software programme will get 5G functionality from Apple starting next week, allowing customers to test the network's speed and stability before a wider release in December.

The users of beta version can give Apple input on usability and quality, which aids Apple in locating problems, fixing them, and improving Apple software.

On iPhones 12 and later, the iOS 16 beta software update will allow 5G functionality. Customers of Bharti Airtel and Reliance Jio who have an iPhone that is supported can begin experiencing 5G speeds the week after next before it becomes widely available. However, the corporation has not officially announced the rollout's precise date. The business has continuously been testing 5G services on Networks in India that are already operational. Apple is expected to activate 5G support on the iPhone 12, 13, 14 series along with the iPhone SE.

The iPhone manufacturer previously announced that a more comprehensive update to iOS 16 that enables 5G capability would be available in December.

"As soon as network validation and performance testing for quality and performance are over, we are working with our carrier partners in India to deliver the best 5G experience to iPhones users," stated Apple in a statement earlier in October. It further informed that,

"5G would be made available to iPhone customers in December through a software update."

The government also earlier made it clear that it wants 5G phones to be prepared for the high-speed mobile broadband services that telecom service providers will concurrently offer on standalone and non-standalone networks.

In a meeting with senior government officials last month, representatives of the mobile phone industry assured to progressively stop making 4G phones that cost more than Rs, 10,000 and switch to 5G technology.

In a meeting with mobile operators and smartphone manufacturers, top officials from the Department of Telecommunications (DoT) and the Ministry of of Electronics and Information Technology (MeitY) gave them a period of three months to have their 5G services up and running with 5G smartphones.

Crossed 1 million 5G customers mark, claims Airtel

Bharti Airtel on Wednesday claimed that it has registered more than 1 million unique 5G users on its network in less than 30 days of the official launch of the 5G service even as it expands its network in Delhi, Mumbai, Chennai, Bengaluru, Hyderabad, Siliguri, Nagpur and Varanasi.

Randeep Sekhon, CTO, Bharti Airtel said,"These are early days but the response from customers have been very encouraging. Our network is being built every day even as all 5G devices are now capable of working on the Airtel 5G Plus network barring a few exceptions which should also be done in the coming weeks. We will continue to advance our network with a vision to connect the entire country."

Airtel is rolling out 5G services in the eight cities in phases as the company continues to construct its network and complete the rollout.

Airtel awarded 5G equipment deals to Swedish Ericsson, Finnish Nokia, and South Korean Samsung. The

telco plans to expand 5G coverage across urban India by December 2023 and the entire country by March 2024.

Airtel launched its 5G services in Delhi, Mumbai, Chennai, Bengaluru, Hyderabad, Siliguri, Nagpur and Varanasi on October 1 and according to the company, the services in these cities are getting rolled out in a phased manner as the company continues to construct its network and complete the rollout.

Vi redefines postpaid offerings in India with new Vi Max plans

Vodafone Idea (Vi), today announced the launch of Vi Max – the Best in Value Postpaid plans in the country – offering More Data, More Control, More Convenience and Unmatched content offerings, to cater to the changing needs of mobile consumers in the digital era, according to the company.

Vi Max is claimed to offer more value for virtually the same price as the previous generation Postpaid plans.

Speaking about the new Vi Max proposition, Avneesh Khosla, CMO, Vodafone Idea Limited said, "We have constantly innovated and redefined the components of our offerings in line with changing user needs and aspirations. By strengthening our Postpaid portfolio with Vi Max, we aim to attract the high ARPU postpaid users to the 5G ready Vi network offering them more power, value and convenience. The large bouquet of differentiated digital offerings, curated as a result of deep-integrated partnerships with domain experts, will now be available to all Vi Max postpaid users helping them thrive in the digital era."

The new Vi Max plans will be available pan-India, effective 1st November, 2022 for all existing and new Vi Postpaid users.

Some features of Vi Max plans include:

- More Data and SMS – Vi customers can now enjoy higher Data quotas, along with Vi's highly popular Night Unlimited benefit, allowing users to do more on Vi's 5G ready network. Vi Max plans also offer 3000 SMS per month.
- More Benefits beyond Voice and Data, such as Entertainment, Travel Discounts, Airport Lounge Access Vi Max Postpaid plans come with a wide range of entertainment offerings such as free subscription to SonyLIV, Amazon Prime, Disney+ Hotstar in addition to Vi Movies & TV. Vi Max users also get access to Ad-Free Music through Hungama's huge library of Music across 20 languages available via Vi Music, as well as access to 1000+ Games through Vi Games on Vi App. Vi Max plans will offer discounts on Flight and Hotel bookings through MakeMyTrip. Other travel benefits such as 7 day International Roaming Pack worth Rs 2999 per year and complimentary access to Domestic & International Airport Lounges will continue to be available on the new REDX 1101 Plan.
- More Control on Monthly Bills – Vi users can also Set their own credit limit via Vi app, which will enable them to have far higher control over their monthly spends
- Priority Customer Service – All Vi Max Postpaid plan users will enjoy Priority Service at Vi Stores, call pick up within 20 secs at Customer Care and depending upon plan type have direct access to Customer Care executives.
- Family Plans: Vi has also upgraded its Family Plans to offer 4 connections at Rs. 999 and 5 connections at Rs. 1149 with Amazon Prime and Disney+Hotstar bundled into them.

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