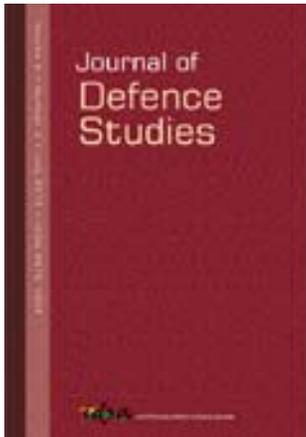


# Institute for Defence Studies and Analyses

No.1, Development Enclave, Rao Tula Ram Marg  
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Vivek Kapur

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# Challenges for Indian Air Force: 2032

*Vivek Kapur\**

*This is the first in a four-article series on the theme 'IAF Deep Multidimensional Change 2032: Imperatives and a Roadmap'. It examines the challenges that the Indian Air Force (IAF) is likely to face when it completes a century in 2032. The main external challenges facing the IAF are the Chinese, Pakistani and Sino-Pak threat, and the need to build and maintain capability for Out of Area Contingency Operations. Internal threats identified fall under groups of technology, including the control of IAF's equipment, cyber warfare, issues stemming from IAF's unavoidable linkages with society at large and issues pertaining to IAF's own organizational structure and policies. The three subsequent articles will discuss the ways and means to address these challenges as well as provide recommendations towards that end.*

## INTRODUCTION

On 8 October 2032, the IAF will celebrate its centenary. This is a landmark for the IAF and it is pertinent to examine the challenges and possible solutions to enable the IAF to continue to perform its mission in defence of the nation as it enters its second century. In this article, I will look at the external as well as important domestic or internal challenges that the IAF will need to face till 2032. Three subsequent articles will look at the implications of these challenges and present a few possible applicable solutions for the IAF to successfully meet these challenges. This article, though standalone, should be read in context of the coming three papers. The second article is likely to look at equipment and force level

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\* The author is a Research Fellow at the Institute for Defence Studies and Analyses, New Delhi. He can be contacted on [vivek-kapur@in.com](mailto:vivek-kapur@in.com).



solutions or IAF in order to meet the external challenges. The third would look at internal issues to be addressed by IAF, including its organizational structure, and the fourth article would round off the discussion while also addressing any left-over issues. Being the foundation article, limited to the challenges alone, there are no recommendations here as these will form part of the next three articles.

The IAF's challenges have been examined under the two broad heads of External Challenges and Domestic/Internal Challenges.

#### EXTERNAL CHALLENGES

##### **Pakistan**

An examination of India's security environment necessarily must look at Pakistan first as it has been an existent threat to Indian security since independence in 1947. India has fought four wars with Pakistan in 1947-48, 1965, 1971 and 1999.<sup>1</sup>

Soon after the formation of Pakistan, its leadership, finding that their country was no match for India, resorted to forging alliances with economically and technologically advanced countries: the US from the 1950s till the 1980s, and with the Peoples Republic of China (PRC) from the 1980s onwards in order to gain access to both high technology and a security guarantor. This was done, in its perception, to be able to counter India's advantages.

The Pakistan Air Force (PAF), in the first three decades of its existence, enjoyed superiority in technology, tactics and training over the IAF due to its close linkages with the US and other North Atlantic Treaty Organization (NATO) countries. Partly due to the IAF's routine re-equipment and partly due to sanctions imposed on Pakistan by the US due to its clandestine nuclear programme, the PAF from the late 1980s<sup>2</sup> found itself in the un-enviable position of facing a disadvantage vis-à-vis the IAF in technology and tactics. Since then the PAF has embarked upon a comprehensive modernization programme with equipment sourced from the US on the strength of its joining the Global War on Terror (GWOT) and its anointment as a Major Non-NATO Ally of the US<sup>3</sup> as well as from the PRC.<sup>4</sup>

Several recent equipment purchases undertaken by PAF appear quite baffling at first glance. PAF has ordered similar equipment from different sources. For instance, it ordered six (later reduced to four) SAAB 2000 aircraft mounted Erieye Airborne Early Warning & Control (AEW&C)

systems from Sweden<sup>5</sup> while also placing orders for four Hawkeye 2000 AEW&C systems mounted on P-3 aircraft from the US<sup>6</sup>, and four ZDK-03 AEW&Cs from PRC.<sup>7</sup> Eighteen F-16C/D Block-52 aircraft and upgrade kits for PAF's older Block-15 F-16s were ordered from USA<sup>8</sup> in parallel with 150 JF-17s, later increased to 250 aircraft, and 36 J-10s from PRC.<sup>9</sup>

These purchases indicate a clear focus of PAF in reducing its recent disadvantage against the IAF so that the former once again achieves technological and numerical parity or even superiority against the latter. Thus, in view of the IAF's falling fielded number of aircraft (operational fighter squadrons have reduced from 39.5 to 29)<sup>10</sup> over the past few years, the situation becomes especially grave as new orders placed by IAF to arrest the fall in numbers have an inbuilt gestation period of at least two to four years for delivery of ordered equipment, and at least a year thereafter to achieve full operational status.

An examination of the PAF is essential as the immediate, short- and medium-term challenge that the IAF would be called upon to face is likely to emanate from Pakistan. Before proceeding to a qualitative analysis of the PAF threat, a quantitative analysis of the PAF is required. The PAF's assessed current Order of Battle (ORBAT) is given in Table 1 below.

Table 1: PAF Current ORBAT 2012

<i>Fighters</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Number Avbl.</i>	<i>Remarks</i>
1.	F-16 A/B Block-15	46 <sup>11</sup>	Original purchase plus 1980s ordered and then embargoed 14 Block-15 F-16s that were finally released by the US and delivered by July 2008. All these older F-16s are being upgraded to Block-52 standard as part of a later deal.
2	F-16 C/D Block-52	18 <sup>12</sup>	A total of 18 new build aircraft have been received. Older Block-15 aircraft are being upgraded to Block-52.
3.	JF-17	11 <sup>13</sup>	Total of 250 are to be inducted. First eight aircraft were imported; rest are to be made at Pakistan Aeronautical Complex (PAC), Kamra. Expected build rates are 15/year till 2015, thereafter increasing to 30/year. <sup>14</sup>
4.	J-7P	127 <sup>15</sup>	Being progressively replaced by JF-17.

<i>Fighters</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Number Avbl.</i>	<i>Remarks</i>
5.	J-7PG	54 <sup>16</sup>	Likely to be replaced by JF-17.
6.	A-5III	35 <sup>17</sup>	Being replaced by JF-17.
7.	Mirage-III	68 <sup>18</sup>	Upgraded under <b>Retrofit of Strike Element (ROSE)</b> program with Beyond Visual Range (BVR) missiles and day and night precision strike capability.
8.	Mirage-V	87 <sup>19</sup>	
	Total	545	
<i>Special Mission, Transport and Helicopters</i>			
1.	SAAB 2000	03 <sup>20</sup>	Erieye AEW&C Deliveries in progress. Integrated with PAF Air Defence system but as per some stray reports not fully compatible with Chinese origin aircraft.
2.	ZDK-03 AEW&C	01 <sup>21</sup>	04 on order, remaining 03 expected shortly. Compatible with all PAF aircraft.
3.	C-130	16 <sup>22</sup>	Includes 6 refurbished former Australian ac.
4.	Dassault Falcon20	03 <sup>23</sup>	2 in Electronic Warfare (EW) configuration. 01 for staff (personnel) / VIP transport.
5.	Il-78 FRA	02 <sup>24</sup>	4 on order remainder 2 to be delivered shortly.
6.	CN-235	04 <sup>25</sup>	One in VIP and three in cargo configuration.
7.	Phenom 100	04 <sup>26</sup>	Staff transport ac.
8.	A310-304	01 <sup>27</sup>	VIP transport, flies in civil colours as Pakistan's 'Air Force-1' equivalent.
9.	F-27 Friendship	01 <sup>28</sup>	Light transport. Nearing end of service life. Dates back to the 1950s.
10.	Y-12	02 <sup>29</sup>	Light transport.
11.	SAAB-2000	01 <sup>30</sup>	Light transport.
12.	Alouette-III	15	Light multi-role helicopter.
13.	Lama	NK	Light multi-role helicopter.
14.	Mi-171	04	Multi-role medium lift helicopter.

<i>Trainers</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Number Avbl.</i>	<i>Remarks</i>
1.	K-8P	28 <sup>31</sup>	Jet trainers. Advanced trainers.
2.	MFI-17 Mushak	149	Locally built version of Swedish aircraft. Basic trainer.
3.	T-37	39	Intermediate trainers.
	Total	216	

The PAF today is no match for the IAF, as it is beset by both technological and numerical inferiority.<sup>32</sup> The PAF today has very limited stand-off Precision Guided Munitions (PGM) delivery capability. Strategically and tactically, PAF is biased primarily towards Air Defence and limited Battlefield Air Strike (BAS) support to the Pakistan Army. Thus, today's PAF does not pose a major challenge to the IAF. The IAF should be able to achieve a position of superiority over the PAF within a few days of in the eventuality of war breaking out, given the former's current numerical (despite its shrunken numbers) and technological superiority (IAF, even at its current reduced 29-32 Sqn strength would field about 576–640 fighter aircraft). Today's PAF is more of speed breaker than a major challenge. PAF, however, is in the process of undertaking a major modernization programme. A few of PAF's modernization programmes initiated earlier are reaching realization with several more in the pipeline. These appear aimed at closing the technology, quantitative, and capability gap with the IAF while hoping to surpass the latter on these three parameters. The programmes that have already materialized to an extent include the induction of SAAB-2000 mounted Erieye AEW&C, the ZDK-03 AEW&C, deliveries of F-16C/D Block-52 aircraft, upgrades of Block-15 F-16s, and local assembly of JF-17 fighters at PAC Kamra, in addition to several weapon and electronics systems inductions.

The next few years are likely to see greater capability enhancements for the PAF. It must be kept in mind that PAF has never let finances stand in the way of its acquisitions to counter IAF, even during periods of martial law (indicating that even the Pakistan Army is fully on board regarding need for a powerful Air Force and is willing to part with funds for the same despite its own needs). With IAF's much publicised joint development of a Fifth Generation Fighter Aircraft (FGFA) in collaboration with the Sukhoi Bureau of Russia,<sup>33</sup> PAF is likely to seek induction of a FGFA itself.

Likely candidates for PAF are the F-35 from the US and the J-20/ J-31 from China. Given the current poor state of US-Pakistan relations, poor Pakistani finances, and the PAF's experience with on/off US sanctions, it is reasonable to expect PAF to prefer to induct J-20 aircraft within the next two decades, possibly on easy finance terms and fewer restrictions.

Table 2 gives an assessment of the PAF ORBAT in the year 2032. In this assessment, the deals already signed with delivery schedules and build rates of indigenous factories along with expected new deals and their assessed likelihood of realization, have been taken into account to arrive at useable estimated figures. This process' results, however, remain just estimates.

Table 2: PAF Assessed ORBAT 2032<sup>34</sup>

<i>Fighters</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Numbers</i>	<i>Remarks</i>
1.	J-10	180	36 <sup>35</sup> already on order with likely follow on orders over next two decades to counter IAF's MMRCA and Su-30MKI.
2.	F-16 C/D Blk-52 or Block-60.	54	All F-16s would be at Block-52 standard as already being executed. Upgrades later to Block-60 standard are likely.
3.	JF-17	300	While 250 are expected to be initially inducted, additional aircraft could be built to enhance combat numbers. Till 2015 the expected built rate at PAC, Kamra is planned at 15/year and thereafter it is expected to be 30/year. Upgrades like Active Electronically Steered Antenna (AESA) radars and high bandwidth secure data links are likely.
4.	J-20/J-31	20	Induction likely to counter IAF's planned FGFA.
5.	J-7PG	20	Dedicated to Battlefield Air Strike (BAS), and Battlefield Air Interdiction (BAI). In process of being replaced by JF-17s.
6.	Mirage-III/V	40	Dedicated to BAS and BAI. In process of being replaced by JF-17s / J-10s.
	Total	614	

<i>Special Mission, Transport, Helicopter</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Numbers</i>	<i>Remarks</i>
1.	SAAB 2000	04	Erieye AEW&C. All 4 received and fully integrated into PAF.
2.	ZDK-03 AEW&C	04	Erieye AEW&C. All 4 received and fully integrated into PAF.
3.	KJ-2000 AWACS	04	A high end full function AWACS to operate in concert with SAAB-2000 Erieye and ZDK-03 AEW&C aircraft.
4.	C-130	08	Awaiting replacements.
5.	Dassault Falcon20/ equivalent type	02	Falcon 20s continue with upgraded avionics and Electronic Warfare (EW) suites or are replaced with equivalent aircraft.
6.	Il-78	04	All four Flight Refuelling Aircraft (FRA) in service and fully integrated with all PAF aircraft.
7.	Transport aircraft with 20 ton payload	16	Induction of such aircraft from Chinese, Russian or European sources to replace the ageing C-130s.
8.	Embraer/ Gulfstream/ Chinese origin	04	VIP transport.
9.	K-8P	120	The main trainer type for advanced flying, fighter conversion training and Battlefield Air Strike (BAS) missions. Possibly a K-8P+ upgraded variant may be available.
10.	CN-235	04	All in cargo configuration, awaiting replacement.
11.	Airliner, West/ PRC	02	For VIP transport as 'Pakistan Air Force One'.
12.	Y-8+/Y-XX	06	For medium lift cargo transportation duties.
13.	UAVs Medium Altitude Long Endurance (MALE)	36	Six squadrons of six craft each. Likely to be able to carry out armed UAV missions. Chinese or Domestic designs

<i>Special Mission, Transport, Helicopter</i>			
<i>Sl. No.</i>	<i>Aircraft Type</i>	<i>Numbers</i>	<i>Remarks</i>
14.	UAVs High Altitude Long Endurance (HALE)	18	Three squadrons of six craft each. Likely to be able to carry out armed UAV missions. Chinese or Domestic designs
15.	Light helicopters.	20	Multi-role helicopters in four to six passenger plus crew capability. European, Russian or Chinese origin.
16.	Light helicopters, high altitude.	20	Multi-role helicopters in four to six passenger configurations with extreme high altitude capability. European, Russian or Chinese origin.
17.	Mi-17-5/? Other modern medium lift multi-role helicopters	30	European, Russian or Chinese origin.

Table 2 clearly brings out that the PAF of 2032 is likely to be a force with capabilities of note. The PAF would have limited stealthy ingress capability and all its frontline aircraft would be of Fourth Generation technology or later, and able to carry out precision attacks from stand-off ranges of more than 50–100 km. The AWACS and AEW&C coupled with Fourth and Fifth Generation fighters would give PAF a very respectable defensive and offensive air power projection capability. The technology gap with the IAF would be almost closed through inductions of J-10, F-16 Block-52/60, AEW&C, FRA etc. (unless game changing hypersonic technologies are inducted into IAF). The quantity gap in favour of IAF would still exist, at least to an extent, if the IAF's re-equipment plans fructify (at projected 45 squadrons strength the IAF would have between 810 and 900 fighter aircraft). With FRA fully integrated, the PAF would be able to address targets even deep inside India or adopt elaborate tactical routing to defeat the IAF's Air Defences. The IAF would face the challenge of containing the PAF's offensive capabilities and denying it easy penetration of Indian airspace while being able to strike at any place within Pakistan at will. Such a challenge would stretch the IAF in terms of technology, numbers, overall strategy, tactics and leadership.

The IAF would require focussed and dedicated effort, utilising at least as many aircraft as fielded by the PAF to contain the latter. Current PAF weaknesses in airlift capabilities would have been remedied for the most part. PAF could be expected to field fairly good **Surveillance, Accurate Reconnaissance, Intelligence and Target Acquisition/Attack (SARITA)**<sup>36</sup> assets, including its own PRC-sourced earth observation electro-optical and synthetic aperture radar satellites.

#### ***PAF Air Defence System***

PAF ground-based Air Defence (AD) Systems could also be expected to be upgraded. The current emphasis on Man Portable Air Defence Systems (MANPADS) is likely to continue, especially for terminal defence of targets in the Tactical Battle Area (TBA) and for the innermost ring of defences forming multi-layered defences of deeper targets. The vintage Crotale Surface to Air Missiles (SAMs) and the more recently inducted SPADA 2000 SAMs are likely to have been replaced with more capable SAMs sourced from PRC or Europe (France, Sweden or Italy). Given PAF's traditional attention to fielding a good AD capability, these weapons are likely to be well integrated into an efficient AD system. Availability of the Chinese-origin FT-2000 anti-AWACS SAM in PAF service is very likely by 2032.

### **PRC**

The PRC is well established on its journey towards becoming the next superpower. It boasts the world's second largest economy after the US with a strong likelihood of overtaking the US in the next 15 years.<sup>37</sup> The PRC's increased economic wherewithal has enabled a major improvement in its military capabilities that already show signs of catching up with the West. This trend is likely to continue till China achieves a very advanced military capability rivalling that of the US. Despite PRC's 'peaceful rise' slogan, its rise is likely to lead to conflict between her and her neighbours, fuelled in large part by the PRC's perceived 'righteous historical' claims on territories held by other nations. The recent South China Sea spat between the PRC and Philippines gives an indication of the former's likely belligerent acts in future as her power grows more.<sup>38</sup> China claims Indian territory in Arunachal Pradesh, Sikkim, Uttarakhand, Himachal Pradesh, Ladakh and Aksai Chin.<sup>39</sup> These territorial disputes coupled with China's growing might and her recent aggressive behaviour all point towards possibility of coercion or conflict in future.<sup>40</sup>

The PRC has identified aerospace and maritime abilities as two vital fields to ensure technological advancement. The dedicated efforts into aerospace by PRC are already showing results (indigenous AWACS, the KJ-2000, KJ-200 and ZDK -03, and FGFA, the J-20) with expectation that this will only get better as time passes.

Table 3 shows the Peoples Liberation Army Air Force's (PLAAF's) assessed current ORBAT. Given the paucity of PLAAF open source data, the data has been culled from multiple generally reputable sources by comparing and matching them to arrive at what are assessed to be reasonably accurate figures. PLAAF is known to seek to co-ordinate its operations with other services. Its air strikes are reportedly planned to be very precisely timed to arrive 'moments after' the arrival of the Second Artillery's conventionally armed ballistic missiles over the targets being addressed.<sup>41</sup>

**Table 3: PLAAF Assessed ORBAT 2012<sup>42</sup>**

<i>Fighters</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
J-8 All Var.	3	80	0	0	12	320
J-7 All Var.	3	72	1	24	21	500
J-10	0	0	2	72	16	300
Su-30MKK	0	0	0	0	5	140
J-20 FGFA Chengdu	0	0	0	0	0	2 under test and develop- ment
J-XX FGFA Chengdu	0	0	0	0	0	0 R&D
J-X FGFA Shenyang	0	0	0	0	0	0 R&D
Q-5 All var.	0	0	1	24	5	120
JH-7A/B	0	0	1	75	2	150
JZ-6 <sup>43</sup>	0	0	0	0	1	30
<i>Type</i>	<i>Luanzhou MR</i>	<i>Chengdu MR</i>	<i>Total PLAAF</i>	<i>Luanzhou MR</i>	<i>Chengdu MR</i>	<i>Total PLAAF</i>
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
JZ-8/8F <sup>44</sup>	0	0	1	24	2	48
J-11B+J-11 <sup>45</sup>	3	120	5	200	14	562
Total=	9	272	11	419	78	2170

<i>Trainers</i>						
<i>Type</i>	<i>Luanzhou MR</i>	<i>Chengdu MR</i>	<i>Total PLAAF</i>	<i>Luanzhou MR</i>	<i>Chengdu MR</i>	<i>Total PLAAF</i>
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
JL-8	0	0	0	0	1	300
CJ-6	2	144	1	72	6	350
JJ-7	0	0	0	0	3	100
Total	02	144	1	72	10	750
Total =	2	144	1	72	10	750

<i>Bombers, Transport, Special Mission and Helicopters</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
H-6U	0	0	0	0	1	10
KJ-2000 Airborne Warning and Control System (AWACS)	1	1	0	0	2	5
Y-8W/ KJ-200 AEW&C	0	0	0	0	1	6
Mi-175	0	0	1	72	1	72
Y-8	1	72	0	0	5	25
Y-5	1	72	0	0	5	200
Il-76	0	0	0	0	1	14
Y-7	1	72	1	72	5	40
An-30	0	0	1	72	2	8
An-24						10
An-26	0	0	0	0	2	12
Tu-154	0	0	0	0	0	04 Electronic Intelligence (ELINT)/ Electronic Counter Measures (ECM)/ Electronic Support Measures (ESM)
Y-8G	0	0	0	0	0	4 recce /surveillance

<i>Bombers, Transport, Special Mission and Helicopters</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
Y-8T	0	0	0	0	0	3 Airborne Command Post (ACP)
Tu-154	0	0	0	0	0	17
Hawker Challenger 800	0	0	0	0	0	5
Challenger 870	0	0	0	0	0	5
Y-8 combat support	0	0	0	0	0	2
B-737-300	0	0	0	0	0	15
B-737-700	0	0	0	0	0	2
Total=	4	217	3	216	24	=336tpt incl 5AWACS, 6AEW&C, 4ELINT, 4recce/surveil, 4EW, 3 ACP

The PLAAF traditionally relied upon relatively large numbers of obsolete fighters to defend its territory in the old Peoples' War concept. It studied the 1991 Gulf War in depth and internalized the lessons derived, that modern air power is essential to military success, and since then has worked dedicatedly to transform itself into a modern air force. Fortunately for the PLAAF, this realization came in parallel with unprecedented availability of high technology to PRC from Russia as well as from Western sources. Most indicative of this trend are the large numbers of modern Russian designed Su-27SK and its local variants the J-11/J-11B, inducted along with other modern Russian weapons. Significantly, in parallel with induction of Russian aircraft, the PRC's domestic industry has delivered indigenously designed and developed modern aircraft such as the FC-1 / JF-17, J-10 fighters in addition to KJ-2000 AWACS, ZDK-03, and KJ-200/Y-8W AEW&C aircraft, and the under-development Chengdu J-20, Shenyang J-31, Chengdu J-XX stealth fighters. It is known that, J-20 apart, another stealth fighter project is being undertaken at Chengdu Aircraft Corporation (CAC) and yet another at the Shenyang Aircraft Corporation (SAC).<sup>46</sup> The latter was unveiled on 31 October 2012 to

be the Shenyang J-31. With the induction of more modern aircraft, the PLAAF's capabilities have increased manifold while absolute numbers have somewhat reduced. Today, the PLAAF is assessed to field 78 regiments of fighters of all types totalling to approximately 2100–2200 fighters. Each PLAAF fighter regiment traditionally had 72–120 aircraft; these numbers have reportedly reduced, in some cases to as low as 36 or below aircraft per regiment, on induction of more capable modern fighters.<sup>47</sup> The cutting-edge aircraft of the PLAAF today are the J-10, J-11B and Su-30MKK units. In Chengdu MR, the PLAAF deploys 11 regiments comprising 419 fighters, including two J-10 and five J-11 regiments (most of Tibet falls under this MR opposite Arunachal Pradesh and central India). In Luanzhou MR (north of Jammu and Kashmir [J&K] state) it deploys nine regiments with 272 fighters, including three J-11 regiments. PLAAF has adequate AWACS, AEW&C and specialized Electronic Warfare (EW), ELINT and airborne command post facilities to provide information dominance in areas of its interest. The more modern PLAAF aircraft are technologically comparable with the state-of-the-art globally and give PLAAF a slight technological as well as an appreciable numerical advantage over the IAF.<sup>48</sup> In view of the IAF's dwindling numbers this indicates a major challenge for it at present, a challenge that is poised to get tougher as the years go by.

Interestingly, the first PLAAF unit to receive its then latest modern fighter, the J-10 (in 2005) was the 132<sup>nd</sup> Fighter Regiment of the PLAAF's 44<sup>th</sup> Air Division based at Luliang Airbase in the Chengdu MR.<sup>49</sup> This location in China's Southern Yunan Province is aligned more towards India than towards Taiwan. This is pertinent as it is often argued that India need not fear a threat from PRC due to its pre-occupation with Taiwan, and that till the Taiwan issue is resolved the PRC would align its best equipment and bulk of resources away from India. The J-10's induction history does not support this argument.

The PRC has a well established record in fast and efficient high-end manufacturing. The estimated rate of building of J-10 fighters by CAC was 24/year<sup>50</sup> in 2003; this was expected to increase once a second line was established. In 2003, J-11 build rate reached 15–20/year<sup>51</sup> at SAC. More complex aircraft like the J-20 and J-31 could be expected to be built at lower rates of 10–15/year, at least initially.<sup>52</sup> Once experience is built up, the build rates for these could climb to the high rates of over 20 aircraft/year, as seen in the J-11 and J-10 programmes; this would only increase further. The PRC has a demonstrated record of meeting

its targets in programme executions. Based upon currently stated aims and known re-equipment plans and build rates of aircraft, the PLAAF ORBAT in 2032 is assessed in Table 4.

**Table 4: PLAAF Assessed ORBAT 2032<sup>53</sup>**

<i>Fighters</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
J-8 All Var.	2	50	1	25	05	126
J-7 All Var.	0	0	0	0	0	0
J-10	3	60	3	60	40	800
Su-30MKK	0	0	1	20	5	100
J-20 FGFA Chengdu	1	20	2	40	9	180
J-XX FGFA Chengdu	0	0	1	20	3	60
J-X FGFA Shenyang	1	20	1	20	3	60
Q-5All var.	0	0	2	53	3	80
JH-7A/B	1	25	2	50	7	180
JZ-6	0	0	0	0	1	30
JZ-8/8F	0	0	1	24	2	48
J-11B+J-11	5	120	5	120	35	800
Total=	13	295	19	332	113	2464

<i>Trainer</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>No.s</i>
JL-8	0	0	0	0	4	300
L-15	2	144	1	72	5	350
JJ-7	0	0	0	0	3	100
Total=	2	144	1	72	10	750

<i>Bombers, Helicopters, Transport and Special Mission Aircraft</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>Type</i>	<i>Regt.s</i>	<i>No.s</i>
H-6	0	0	0	0	0	0
H-6U FRA	1	20	1	20	5	100
KJ-2000	1	3	1	3	4	12
Y-8W/KJ-200	1	3	1	3	6	18

<i>Bombers, Helicopters, Transport and Special Mission Aircraft</i>						
<i>Type</i>	<i>Luanzhou MR</i>		<i>Chengdu MR</i>		<i>Total PLAAF</i>	
	<i>Regt.s</i>	<i>No.s</i>	<i>Regt.s</i>	<i>Type</i>	<i>Regt.s</i>	<i>No.s</i>
Z-10	1	25	2	50	10	250
Y-8	1	5	1	5	5	25
Y-5	1	40	2	80	5	200
Il-76	1	10	1	10	5	50
Y-7	1	10	1	10	5	50
Y-XXH heavy	1	10	1	10	20	200
Y-XX2 medium	1	10	1	10	10	100
Tu-154	1	3	1	3	4	12 ELINT/ ECM/ESM
Y-8G	1	2	1	2	5	10 recce /surveillance
Y-8XZ	1	2	1	2	6	12 EW
Y-8T						08 ACP
Il-78/Y-XXH/C-919/A-330 MRTT FRA	1	5	1	5	10	50
Tu-154/ CRJ					1	10
Hawker Challenger800/ CRJ					1	5
Challenger 870/ CRJ					1	5
Y-8 combat support					2	8
C-919					2	10
Total=	14	148	17	285	101	=1405tpt incl AWACS, AEW&C, ELINT, EW, recce/ ACP/etc.

In deriving the expected PLAAF strength in 2032, the assessment that the PRC has the ability (both industrial as well as economic) to build large numbers of equipment backed up by a clear political desire to rise to

become a global power with global responsibilities, supplanting the US, has been factored in. The fully modernized and expanded PLAAF is likely to pose the greatest military challenge to IAF in 2032.

By 2032, the PRC is likely to be the world's largest economy.<sup>54</sup> This new-found economic clout is likely to translate into the PRC demanding a Sino-Indian border issue resolution in its favour while possibly also demanding concessions in Jammu and Kashmir for itself and for its satellite, Pakistan, backing these demands with a powerful military and economy. The PLAAF would, based just upon its assessed and projected 2032 force structure, be in a position to ensure total information dominance over IAF.<sup>55</sup>

While it is seen clearly that the PLAAF is the greatest challenge IAF is likely to face in 2032, it is important to remember that an even greater challenge would be the PLAAF and PAF acting in concert against India. Given that Pakistan is China's most dependable satellite, this possibility cannot be discounted and facing up to this would require preparing to fight a two-front war against technologically superior or, at best, equal forces with the enemy enjoying a numerical advantage. Meeting this challenge will form part of the next article in the four-article series.

Issues regarding comparison of these assessed threat forces with current band expected IAF ORBATS in 2032 form the core of the second article in the series.

#### **POSSIBLE NATURE OF FUTURE INDIAN WARS**

Conventional wars are most likely to be fought with either Pakistan or/and China.

##### **Pakistan**

Given that the Pakistani perspective on the unfinished business of the 1947 Partition revolves around the Pakistani desire to annex the state of J&K, which is claimed to be the 'core issue' between the two countries and that, in most cases, the wars fought have commenced in the state—1947-48, remained confined to J&K; 1965, spilled over into the plains; 1999, commenced in and stayed confined to J&K—there is strong likelihood of Pakistan initiating hostilities in J&K area when it perceives a chance to seize that territory from India. Such a war would, in all likelihood, commence in the mountains and stay confined to these areas as India

fighters to repel the attackers while selectively adjusting the Line of Control (LoC) to advantage. The likelihood of the war spilling over into the plains is much lesser than hitherto due to the presence of nuclear weapons and Pakistan's carefully cultivated low threshold for use of atomic weapons. For instance, despite great difficulties faced by the Indian Armed Forces during the 1999 Kargil war in vacating the aggression, military operations remained confined to the Kargil-Dras-Batalik sector. In contrast, in 1965 Pakistan's 'Operation Gibraltar', which involved regular and irregular forces infiltrating into J&K coupled with regular conventional military aggression across the LoC, was met with the Indian Armed Forces crossing the international borders in the plains of Punjab and Rajasthan. The major difference between 1965 and 1999 was that the nuclear weapons constraint was not there in 1965, unlike in 1999.

In sum, future wars with Pakistan are likely to be predominantly confined to the mountainous terrain of J&K.

#### ***PAF Doctrine***

The PAF has, since inception, espoused a doctrine of fighting outnumbered and, in order to overcome its numerical inferiority against India, made its doctrine one of 'Offensive Defence'.<sup>56</sup> In Offensive Defence, the PAF is likely to try its utmost to carry the war deep into Indian territory while maintaining its traditional emphasis on Air Defence.

#### **China**

India has no designs on any part of Chinese territory. However, China lays claim to the entire Indian state of Arunachal Pradesh apart from pockets of Indian territory in Sikkim, Uttarakhand, Himachal Pradesh and the Ladakh region of J&K. In addition, China has been in illegal occupation of the Aksai Chin region of J&K since 1962. China regularly vocalizes that recovery of its 'lost' territories is a sacred duty of the Chinese people. As Chinese power has grown towards near-superpower capabilities, it has shown greater belligerence and aggression in dealing with contestants to its own territorial claims as seen earlier this year in the South China Sea against the Philippines and Vietnam. As China's power grows more in the period till and after 2032, it is reasonable to expect China to become more aggressive in trying to gain physical control of the Indian territory claimed by it. This is likely to lead to war in the mountains with Indian military forces trying to defend against Chinese aggression.

This mountain war is likely to be characterized by the Chinese concept of 'Local Border War under Informationized Conditions'. This concept revolves around extensive use of cyber warfare, electronic warfare, and a combined forces approach to seize control of the physical and virtual battle space.

Much has been read into PRC's cessation of hostilities and withdrawal in 1962, but it requires to be borne in mind that at the time, the PRC was a true Third World country and had to stay within boundaries set by the then two superpowers. Moreover, the PRC claims on large sections of our territory post-date that period and the earliest Chinese claims to Arunachal can be traced to the mid-1960s.<sup>57</sup>

The Peoples Liberation Army (PLA) and PLAAF's strategy is likely to be to coerce India into submission through threats alone. Failing this, the PRC would initiate actions of 'Shock and Awe with Chinese Characteristics', commencing action with a massive cyber attack on critical Indian infrastructure and arms of governance.<sup>58</sup> This would be followed by a massed conventionally-armed ballistic and cruise missile attack on important military and civil nodes and infrastructure,<sup>59</sup> including Indian space assets. This missile attack would be followed at saturation raid intervals of time by massive air attacks aimed at seizing control of the air and battle-space while destroying Indian military units' combat capability, aiming to lead to a swift roll up of the Indian military forces. China is likely to prefer using coercion short of war to achieve its goals.<sup>60</sup>

The challenge from China is likely to include cyber warfare, well developed space access and space denial capabilities, and conventionally armed ballistic and cruise missiles apart from advanced fighter, bomber and special mission aircraft. The challenge is likely to be further complicated, as per current indications, by an overwhelming Chinese superiority of numbers across the spectrum.

### ***PLAAF Doctrine***

While China does not publish its doctrine openly, it is assessed that the PLAAF war doctrine is likely to encompass close integration with space, 2<sup>nd</sup> Artillery, PLA and information operations in the earlier Active Defence concept modified for 'Local Wars under Informationized Conditions'. Great emphasis is placed on the information fight and achieving information superiority. How this is likely to pan out on the battlefield has already been touched upon earlier in this document.<sup>61</sup>

### **CAPABILITY TO DEAL WITH OUT OF AREA CONTINGENCIES (OOAC)**

If India's economy and power continue to grow as projected by Jim O'Neil<sup>62</sup> and other Goldman Sachs researchers, India's areas of interest would progressively expand to cover more areas well outside the Indian sub-continent. In such a situation, the IAF may be called upon to take military action or deploy air power in support of India's national interests well beyond our borders. Such requirements span a vast spectrum—from just Humanitarian and Disaster Relief (HADR) primarily flying in relief material, through flying in ground forces suitable for the required task, to application of hard military force in areas remote from the Indian sub-continent. This could be a situation of our forces having to 'Fight (their way) In', do their task and then 'Fight (their way) Out' (FIFO). Hence, the IAF must develop and field credible capability to undertake OOAC operations across this entire spectrum from pure HADR to FIFO in addition to its other more conventional tasks. Such a capability would pose a challenge to IAF in terms of its being set up and maintained, and is likely to involve access to airfields in other geographies on mutual understanding, treaty or leased permanent foreign base basis.

Currently, with fears of stagflation looming large on the Indian economic horizon, uncertainties abound and a recurrence of the resource crunch faced in the early 1990s does not appear unrealistic, thus adding greater uncertainties to the planners' plans for the future. Fears of stagflation aside, the slowdown in the Indian economy is clearly discernible with GDP growth having fallen to 5.3 per cent in the first quarter of this financial year 2012-13.<sup>63</sup>

A detailed discussion of OOAC requirements, including FIFO in the OOAC context will be discussed in greater detail in the second article of the series.

### **DOMESTIC CHALLENGES**

#### **Technology**

The IAF, by its very nature, is technology intensive. Due to earlier constraints of domestically available scientific and technological capabilities, the IAF was a technology taker, adapting its doctrine, strategy and tactics to the technology available from foreign sources. More recently, the ability of indigenous design and manufacture organizations has increased manifold in several different areas.

As the IAF looks ahead to 2032, it requires deciding upon the type and nature of the technology it should invest in for the future. It requires to be certain about the capabilities it would require in the 2032 timeframe and then dispassionately analyse the available options and the real world practicality of new technologies. This would help it take informed decisions about the research and development efforts it should invest in. For instance, while assured penetration of hostile airspace could be a desired capability required, this capability could be achieved through use of 'Stealth' aircraft or through hypersonic 'space-planes', or even through attacks from platforms based in Outer Space. In most cases, there will be more than one way to achieve an end. Such choices will carry an element of risk. The challenge for the IAF with respect to technology selections will be to arrive at reasoned decisions with adequate risk alleviation strategies built into its plans.

The IAF would also require development/induction of suitable technologies for effective air-to-ground attack in the mountains, given that India's disputed territories for the most part lie in the Himalayas<sup>64</sup>; in 1999 in Kargil, effective attack in mountains was a major challenge for the IAF.<sup>65</sup> It will require identifying leapfrogging technologies in order to retain ability to counter the PLAAF and other air forces.

Defence Research and Development (R&D) and the Indian Aerospace industry would be discussed in detail in the final two papers of the four-paper series.

### ***Cyber Warfare***

Another branch of technology that demands mention here is that of the cyber domain. The IAF is making rapid strides towards becoming a fully-networked force able to execute networked operations. These networked operations and capabilities reside in the availability of computers and reliable infrastructure to connect them into one seamless entity. Such new capabilities, however, bring new vulnerabilities in tow.<sup>66</sup> Enemy attacks on this network and its component parts could be devastatingly paralysing to the extent that the IAF is made non-functional. Therefore, along with induction of cutting-edge technology, the IAF requires to devise effective means of insulating itself from the new vulnerabilities that accompany the new technology inducted. The possible solutions and methods to meet the cyber challenge will form part of the third article in the series.

### ***Joint Operations***

Future wars are likely to require joint operations of an extent not required hitherto. Therefore IAF must include a tie in with the Army and Navy when planning its new inductions to ensure that the capability for joint operations is enhanced progressively leading to the ideal of seamless joint operation capabilities.

A more detailed discussion on this aspect will form part of Paper 3 or Paper 4 and not in this paper.

### **The Problem of Plenty**

Being a technology-intensive service, the IAF requires investing in expensive equipment on a regular basis. Towards the end of the 1980s and in the early 1990s, as India was undergoing a major economic crisis, funds were unavailable for new purchases of equipment. Subsequent to economic liberalization and the faster growth of the economy, by the early 2000s, lack of funds was no longer an issue. However, with money in the pocket there has been a distressing tendency to go shopping to glitzy malls as it were instead of making long-term investments for a sustainable future. This can be seen in the purchases of imported radars, including the Aerostats from Israel, Phalcon AWACS from Israel, the Medium Multi-Role Combat Aircraft (MMRCA) competition, Embraer EMB-145 business jets, and Boeing Business Jets (BBJs), to name a few. In a few cases the purchases made could have been done without, instead focussing on long-term benefits from better utilization of the same funds in indigenous R&D. This situation possibly arose as the discipline enforced by limited availability of funds was absent at the time. However, the recent fall in India's growth rate<sup>67</sup> as well as in the value of the rupee<sup>68</sup> indicates that the spectre of paucity of funds may be poised to return. A well-conceived, pragmatic, long-term perspective plan could assist towards this end. Indigenous development of technology is essential for the long-term security of the country, even though it is quite likely that, at least initially, indigenous efforts may not deliver 'best in class' products. However, given time, the quality and capabilities of indigenous equipment is bound to improve. Papers three and four will briefly look at Defence Research and Development Organization (DRDO) and the other Defence Public Sector Units (PSUs) with the intention of looking at some solutions to make these more responsive and efficient.

A small point here on costs. It is often brought out that making say a Jaguar aircraft in India costs more than the same product bought from British Aerospace. This, as we are seeing in press releases on the current MMRCA deal and in discussions on the offsets clause of the current Defence Procurement Policy (DPP), is primarily because the foreign supplier compensates himself for his losses in manufacturing due license production or offsets by increasing costs of critical parts that would still be imported for the locally-built aircraft or by increasing the final contract price by an amount to recover these losses.<sup>69</sup> For instance, till its production line was shut down, the MiG-21 built in different variants in India since 1967, till the very end even aircraft 'built from raw materials' locally by Hindustan Aeronautics Limited (HAL) incorporated a few critical parts directly imported from the Soviet Union. The supplier naturally recovered some of his losses through very high prices for these. Stories about spare parts priced close to the current bullion rates surface from time to time in the open press. Only through indigenous design and complete manufacturing can a nation free itself from such external constraints and exploitation. This, in turn, can be achieved best through the facilitation of the growth of a viable aircraft sub-components ancillary industry to support large public and private sector full system integrators in the aviation field.

### **Societal and Economic Challenges**

The IAF draws its personnel from the pool of Indian citizens. Despite strong military service socialization and training, the organization cannot help but be affected to a degree by events in society at large. This is throwing up challenges which need to be addressed.

#### ***Shortfalls in Manning***

Since initiation of economic reforms in 1991, several sections of the economy have boomed. This has led to a preference amongst the youth to join high-paying and relatively low discomfort corporate or information technology (IT) jobs. IAF's existing problems with attracting adequate young people of the right calibre—currently IAF is short of 837 officers including 426 pilots<sup>70</sup> and is short of 8,000 personnel below officer rank (PBOR)<sup>71</sup>—are likely to get exacerbated. This is especially so because by 2032 India is projected to become the third largest economy in the world<sup>72</sup> with, in all probability, attendant increases in job opportunities in the corporate sector due to accompanying

economic growth. This is likely to lead to growth of corporate sector salaries<sup>73</sup>, further challenging recruitment of high-quality individuals. Possible solutions to this issue will be provided in later articles in the series.

### ***Wastage of Manpower***

This situation of a lack of manpower is made worse by the IAF's tilt towards the fighter stream of the flying branch for promotions to higher ranks and for several posts at all levels. While the IAF's human resource system appears to meet the organization's requirements, there is scope for improvement to make the system more efficient in utilizing all available resources effectively for the greater good of the service. This aspect will be examined in detail in a subsequent article.

### ***Corruption***

Corruption, a sad fact of life in India, has reached a zenith in the recent past with scams of all shades and hues surfacing on a distressingly regular basis.<sup>74</sup> What is of great concern is the rapidity with which this corruption menace has infiltrated the military force including the IAF.<sup>75</sup> While the IAF appears to have a more robust resistance to this ill, corruption has potential to destroy the service's war-fighting capabilities from within. Besides being a drain on service resources, corruption can destroy the ethos of the service to an extent that personnel remain in the system to milk it for personal gain alone, to the detriment of their abilities to perform their actual military combat tasks. Corruption is not linked to money matters alone; instances of personnel causing loss of life and material through acts of commission or omission along with those who get involved in the cover-up and condoning these acts are as guilty of corruption as those involved in comparatively petty theft. Often these acts are committed in the zeal to climb higher up the steeply pyramidal hierarchy of the concerned service. It is therefore necessary to address this aspect in order to ensure that the IAF stays clear of this scourge and continues to enjoy the good reputation it has traditionally enjoyed.

### ***Sub-optimal Utilization of the Cadre***

The IAF has seven branches for its officers<sup>76</sup> and 15 trades for its PBOR.<sup>77</sup> This division delivers the benefits of specialization but also leads to major wastage of personnel as, for most jobs, a specialist from a trade

or branch is required. The result is that the actual work output (or productivity) often is less than what the number of people on strength would indicate; this is because for many tasks multiple specializations are required. Aggravating the situation is the trend of raising new units from within existing resources in interest of quick inductions of new equipment, leading through this expediency to numbers that look good on paper but are actually sub-optimal combat capability realization on the ground.

#### CONCLUSION

It is quite clear that by 2032, the IAF will face a multitude of major challenges from outside the country and also within the country. It requires identifying these challenges and putting in place viable strategies to deal with these effectively. The major external challenges are from the PAF, PLAAF and the need to field credible capabilities for OOAC. Internal challenges include shortfalls in manning levels, suboptimal utilization of personnel, and corruption. It is important for IAF to work in a dedicated and focussed manner to overcome these challenges in the years ahead. The three subsequent articles will aim to address these challenges in order to arrive at reasoned solutions to these and a roadmap of the deep multidimensional change required by the IAF by 2032.

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  59. There is oft-expressed view that ballistic missiles cannot be used in the conventional role lest they elicit a nuclear response from the target country. This fear flows from the period when ballistic missile defence was not technologically possible by the West and flows primarily from Western writings on the subject. At this time, there was proliferation of relatively cheap ballistic missiles that gave low-technology countries the ability to hurt more advanced nations. The canard of doubt of the missile type served in a way as a means of removing these missiles from the theatre. In some exceptions these were used, for instance, during Gulf War I of 1991 by Iraq against Saudi Arabia-based US military targets and against civilian targets in Israel. In both cases, there was no nuclear retaliation, that too from countries that did not subscribe to a 'No First Use (NFU)' doctrine. China, on the other hand, has no reservations in stepping outside international treaties and rules of behaviour as seen in its South China Sea territory claims. China is likely to state that she intends to use non-nuclear missiles and expect to be believed completely. Moreover, both India and China have NFU nuclear doctrines which envisage launching retaliatory nuclear strikes only after absorbing an enemy first strike. Both also are in process of putting in place Ballistic Missile Defence (BMD) systems. Thus, in this context, I do not see any fear of a conventional ballistic missile strike leading to an accidental nuclear response.
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