				Estimated Number of	IN	F	unctional Require	ements (See	Definitions E	Below)		F	unctional Require
				Communications Nodes to be Deployed for Each Application (e.g.	Estimated Number of End Point Devices to be Deployed for Each Application (e.g. millions of meters)	AC Independence	Bandwidth Throughput Estimated	Coverage	Latency	Reliability	Security	AC Independence	Bandwidth Throughput Estimated
				thousands of	millions of meters)		Qua	ntified Estim	ates			Ranking of	Relative Importan
			Remote Meter Reading (based on hourly reads)	Cellular network	5000	30 minutes	19.2K	>90%	<15 sec	>95%	4	1	2
		Advanced Metering	Direct Load Control	22	250K	8 hours	1K	100%	<120 sec	>99%	2	1	2
	mer		Real time pricing										
	Customer	Distributed Gen	eration Management										
		PHEV Integration	At the customer premises										
		Drieing Cignole	At charging stations to Smart Appliances										
			y of Customer Usage										
		in-ноте Displa	y or Customer Usage										
		Automated	Feeder Switching	53	1755	8 hours	9600 bps	>90%	5 sec	<5 per mo. >95%	5	2	1
		Capacitor Bank Control	CBC-5000 CBC-7000	22	2330 1621	8 hours	1K	>60%	10 sec	>99%	4	1	2
	<u>io</u>	· ·	LVC	N/A	638	4 hours	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	ibut	Fault Cur	rent Indicator										
	Distribution	Transforn	ner Monitoring										
		Voltage and C	Current Monitoring	See comment									
Applications			/Distributed Generation										
olica Si ca		Network Prot	tection Monitoring	See comment									
Арк			ork Management	N/A									
	S	Remote Cor	nnect/Disconnect	N/A									
	tion	Meter Dat	ta Management										
	Operations	Outage	Management	Customer Calls									
	o	Distribution A	Asset Management										
		Distribution Ne	etwork Management										
		Demar	nd Response										
	ion	Wide Area Situation	onal Awareness (PMUs)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		

	10					1	1		T				1
	niss	Line Protect	ction and Control										
	nsu												
	Transmis												
								1					
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			Billing										
	der												
	Š	Customer Infor	mation Management										
	Service Provider	Consum	er Web Portal										
	ice	Consum	T Web i ortai		1			-					
	e Z												
	S												
		Emorgo	ency Response										
	ē	Emerge	elicy Response										
	Other	Routi	ne Dispatch										
	O		ce Automation					1					
		WORKION	T Automation										
		1											
Į.								ļ					
L				Com	nments (explain your an	swers below)							
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-		1											
		-											
		See additional entries belo	ow										
			1		1		1						
Į					e report your data base								
	S.	AC Independence	After the loss of electric service										
I	al	Bandwidth	Estimated or tested data rates	are required to suppo	rt this application durin	g normal and emerge	ency conditions (m	easured in k	ilobits per s	econd (kbps))			
	ion	Coverage	Geographic areas that these ne	tworks are required to	o operate (estimated pe	rcentage of service t	erritory).						
I	nct	Latency	How quickly does field data ne					t roundtrip))	?				
	Functional Requirements	Reliability	How many service interuptions							99.999%)?			
	~	Security	How secure must the network						, , , , , , , , , , , ,	, .			
ľ			The state of the s		, 21121 (01 4 304		,	01.					
}			Note that when ranking the fu	nctional requirement	s in terms of importance	e 1-6 rank them from	m 1 as the lowest	and 6 as the	most impo	rtant			
}			Troce that when ranking the ru	nctional requirement	3 in terms of important	C 1-0, Talik tilelli 1101	in a as the lowest	and o as the	most mipo	i tailt			
			 	-				-			-		
		Ti1 C- D !!											
	ns	Tier 1 – Core Backbone	1				L		<u> </u>		<u> </u>		
I	cations	ons and will typically be a	architected in a self-healing ring	topology or point-to-	point with backup circu	iit redundancy. The	core may have po	ints-of-prese	ence in subs	tations and ot	her compai	ny tacilities.	
I	ica												

l c									1			
n ur	ier 2 – Backhaul Distribution											
ewi	concentrators, etc. from the	e field access tier of the netw	ork and provide a deliv	ery transport bridge to	the core backbone	tier.						
id Commu												
Fig. 4	Tier 3 – Access											
Smart Grid Commur Framework	nile communication or Field	Area Network and will be rel	atively low bandwidth	for hand off to the Ba	ckhaul Distribution 1	ier.						
m ai												
S	4 – Home Area Network (HAI	N)										
	d on a standard but is likely t	to consist of technologies like	ZigBee or Home Plug	which may connect di	ectly with communi	cation Tier 3, Tier	2 or Tier 1.					
	Licensed Wireless Radio		Drivete	licensed wireless radio	notworks operating	under Dert OO of	the FCC mules					
			Private	licensed wireless radio	networks operating	under Part 90 of	the FCC rules	5				
	Licensed Wireless		Private lice	nsed wireless microwa	ve networks operation	ng under Part 101	of the ECC r	ules				
ω.	Microwave				<u> </u>							
Ö	Unlicensed Wireless		Private unlicensed wire	eless radio networks op	perating under Part 1	5 of the FCC rules	(e.g. Wi-Fi, \	NiMAX, Zigl	pee)			
Opt	Fiber			Private fiber net	works owned or cont	rolled by a utility						
) \S	Other Private Network		Privat	te networks that are ne	either fiber nor wirele	ess, such as power	rline carrier					
Technology Options	Commercial Wireless	Col	mmercial networks tha	t onerate using licenses	d radio under Part 23	of the ECC rules	le a Verizon	AT&T Sprin	nt etc)			
h	Network (Licensed)	CO	crciai networks tild	c operate using needser	a radio undei Fail 22	. or the recruies	10.6. VCI12UII,	,α., υμπ	11, 010.7			
Tec	Commercial Wireless	Commercial	networks that operate	using unlicensed radio	under Part 15 of the	ECC rules le a wi	roloss intern	ot convice n	roviders (M/ISD	c))		
	Network (Unlicensed)	Commercial	networks that operate	using unileerised radio	under Fait 15 of the	ree ruies (e.g. wi	reless intern	et sei vice pi	TOVIGETS (WIST	3//		
	Commercial Wireline	Comr	nercial networks that u	se any wireline techno	logy including fiber	DSI coay or tradi	tional twister	d nair conne	or circuits)			
	Network	Com	nerelal networks that a	ise any wireline teerino	logy, including liber,	DJL, COUX OF GRACI	tional twister	и ран соррс	i circuits)			
	Satellite		Satellite includes all typ	oes of fixed and mobile	satellite services, inc	luding Very Small	Aperture Te	rminals (VS	ATs)			
	N ₀	ote that when ranking the Te	chnology Options in te	rms of preference 1-9,	rank them from 1 a	s the most prefer	red and 9 as	the least pr	eferred.			
Oth	er BGE-owned	assets not acc	ounted for	above								
—			Estimated Number of			unctional Require	L ements (See I	! Definitions I	LBelow)		F	unctional Require
			Communications	Estimated Number of								
			Nodes to be	End Point Devices to		Bandwidth						Bandwidth
			Deployed for Each	be Deployed for Each	AC Independence	Throughput						Throughput
			Application (e.g.	Application (e.g.		Estimated	Coverage	Latency	Reliability	Security	AC Independence	Estimated
	+		thousands of	millions of meters)			ntified Estima		Hemability	Security		Relative Importan
+	+		anousanus of			Qua	The Local Local III		1	I	ranking of	Treative important
er	BGF-owned cellular co	mmunications network	27	6000	24 Hrs	19.2K	>95%	<3 Sec	>99%	5	3	6
Othe	MV		_	5000	8 Hrs	9.2K	75%	<5 Sec	>95%	3	3	6
	IVIV	7-30	-	3000	0 HIS	9.21	/5%	<2 26C	295%	_ 3	3	D

ments (See I	Definitions B	Below)				Tech	nology Optio	ns (Rank pre	ference 1-9 for e	ach below)					Techno	logy Optior	ns (Rank pref
Coverage	Latency	Reliability	Security	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed Wireless	Fiber	Other Private Network	Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed Wireless	Fiber	Other Private Network
ce of Each Fi	unctional Re	equirement (1-	6)					Tier	1								Tier
6	3	5	4	N/A	N/A	N/A	N/A	1	2	N/A	3	N/A	N/A	N/A	N/A	N/A	1
6	3	5	4	3	N/A	N/A	1	2	N/A	N/A	4	N/A	1	N/A	N/A	N/A	2
5	3	6	4	3	N/A	N/A	2	1	N/A	N/A	4	N/A	1	N/A	N/A	N/A	N/A
6 N/A	3 N/A	5 N/A	4 N/A	3 N/A	N/A N/A	N/A N/A	1 N/A	2 N/A	N/A N/A	N/A N/A	4 N/A	N/A N/A	1 N/A	N/A N/A	N/A N/A	N/A N/A	2 N/A
N/A	NA	IVA	IVA	14/7	14/74	N/A	IVA	14/74	N/A	14/74	14/7	IVA	NA	14/74	14/74	N/A	IV/A

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ments (See [Definitions P	selow)				Tech	nology Optio	ns (Rank pre	eference 1-9 for e	ach below)					Techno	logy Option	ns (Rank pre
							0, 1		Commercial	Commercial						57	
				Licensed	Licensed			Other	Wireless	Wireless	Commercial		Licensed	Licensed			Other
				Wireless	Wireless	Unlicensed		Private	Network	Network	Wireline		Wireless	Wireless	Unlicensed		Private
Coverage	Latency	Reliability	Security	Radio	Microwave	Wireless	Fiber	Network	(Licensed)	(Unlicensed)	Network	Satellite	Radio	Microwave	Wireless	Fiber	Network
ce of Each Fu	inctional Re	quirement (1-	6)			11.1.51055	201	Tier		(Ormeensed)	TOUTO IN	- Catchine					Tier
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erence 1-9 for ea	ach below)					Technolog	gy Options (Rank prefer	ence 1-9 for ea	ich below)					Technol	ogy Options	(Rank prefe
Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed Wireless	Fiber	Other Private Network	Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite	Licensed Wireless Radio	Licensed Wireless Microwave	Unlicensed Wireless	Fiber	Other Private Network
2								Tier 3									Tier 4
N/A	N/A	2	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	1	4	3	8	2	5	6	7	9	1	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	1	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	1	4	3	8	2	5	6	7	9	1	N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

erence 1-9 for ea					Technolog	gy Options (Rank prefer	ence 1-9 for ea					Technol	l ogy Options I	(Rank prefe
erence 1-9 for ea Commercial Wireless	ch below) Commercial Wireless	Commercial	Licensed	Licensed Wireless	Technolog	gy Options (Rank prefer Other Private	ence 1-9 for ea Commercial Wireless Network	Commercial Wireless Network	Commercial Wireline	Licensed Wireless	Licensed Wireless	Technology Unlicensed	ogy Options	Other

rence 1-9 for e	ach below)		
Commercial Wireless Network (Licensed)	Commercial Wireless Network (Unlicensed)	Commercial Wireline Network	Satellite
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A
N/A	N/A	N/A	N/A

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Commercial	Commercial		
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