

**TACTICAL *REPEATER* &
RETRANSMITTER SYSTEMS
and
*REMOTE BASE OPERATIONS***

***Special Presentation to the
2019 ASRC Winter Retreat***

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FUNDAMENTAL *RULES*

COMMUNICATIONS IS YOUR LIFELINE!!

- * *IN FIRST! OUT LAST!*
- * *ALWAYS ON & LISTENING!*
- * *COVERAGE EVERYWHERE!*
- * *ALWAYS ABLE TO SUPPORT
& COORDINATE!*
- * *EVERYBODY IN FIELD OR
AT RISK NEEDS COMMS!*
- * *ALWAYS HAVE BACKUPS!*

COMMS QUESTIONS

WHAT ARE RELAYS, REPEATERS & RETRANSMITTERS?

But must understand::

What are the actual *operational mission needs* for sar, cave & other tactical operations?

Why are *our* tactical & deployed operations & needs so *different*, and so *hard to accomplish*?

Why do we need “*good*” communications?

What *are* good (*essential!*) Communications?

What do we mean by reliability, availability, suitability, viability, security, range, coverage, propagation, capacity, contention, *interoperability*... (insert many other buzzwords!!)

(lots *more* questions, issues, concerns...!)

CONTENTS

Star & multipoint networks

Isolated nets

Manual voice relay

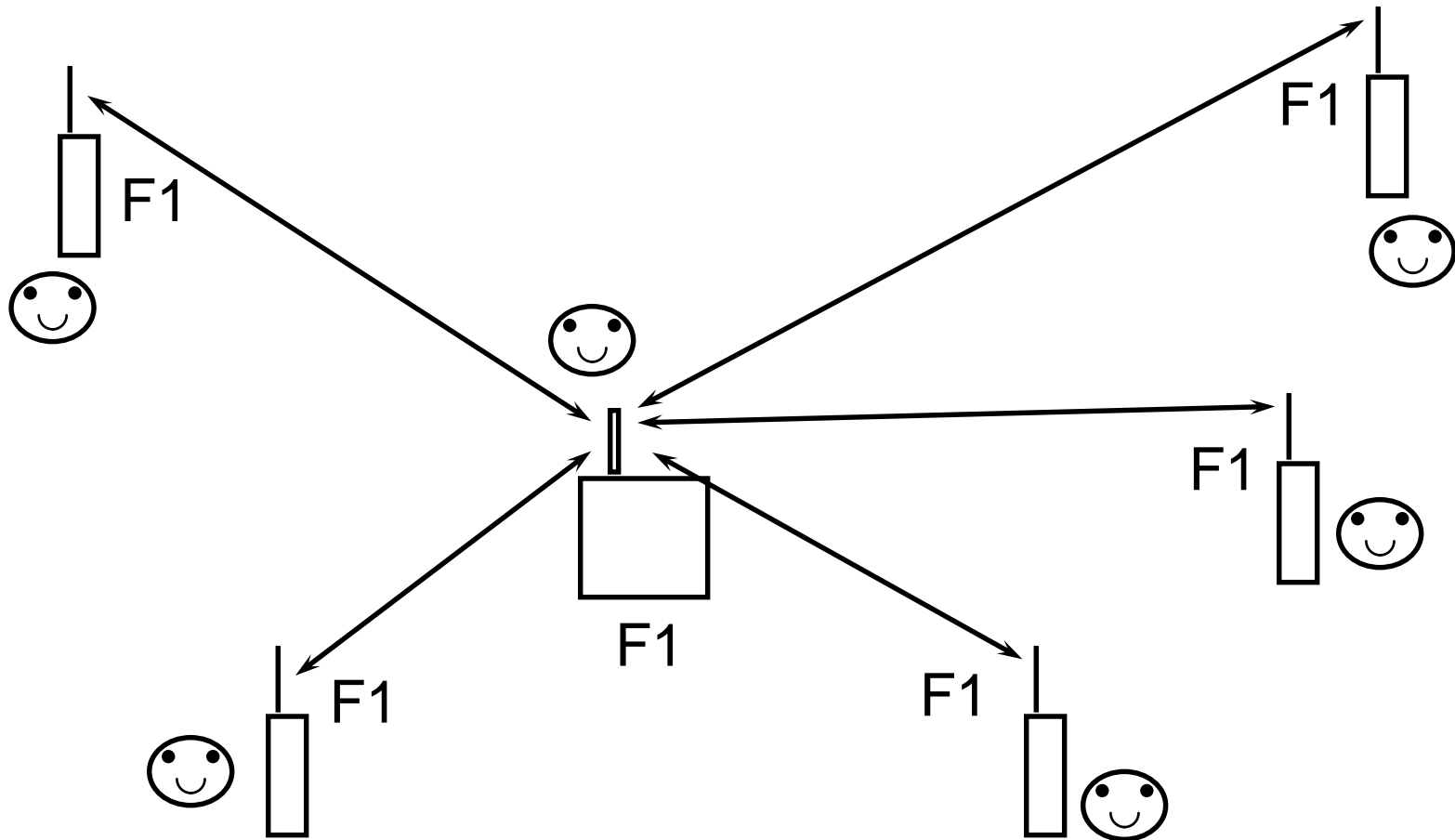
Automatic repeaters

Automatic retransmitters

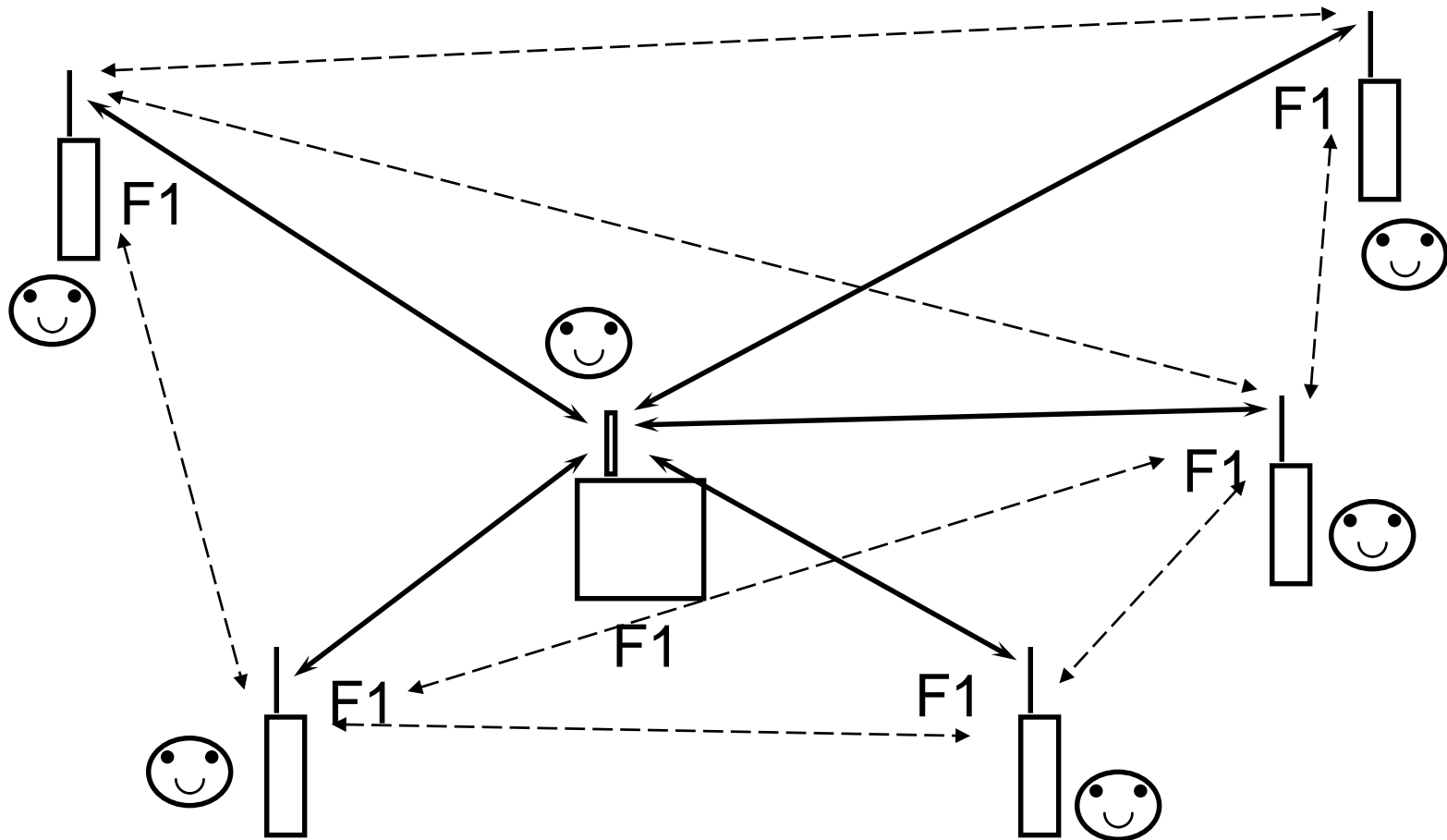
Local & remote base systems

Retransmitter design & costs

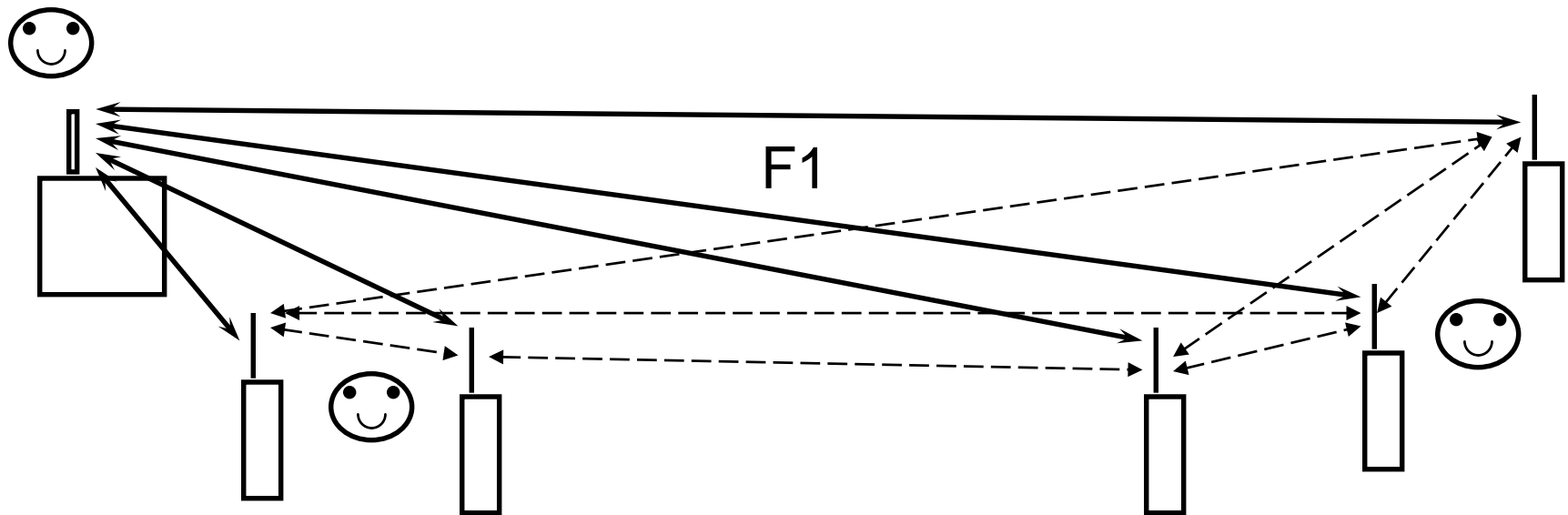
STAR NETWORK (SIMPLEX)



MULTIPOINT NETWORK (SIMPLEX)

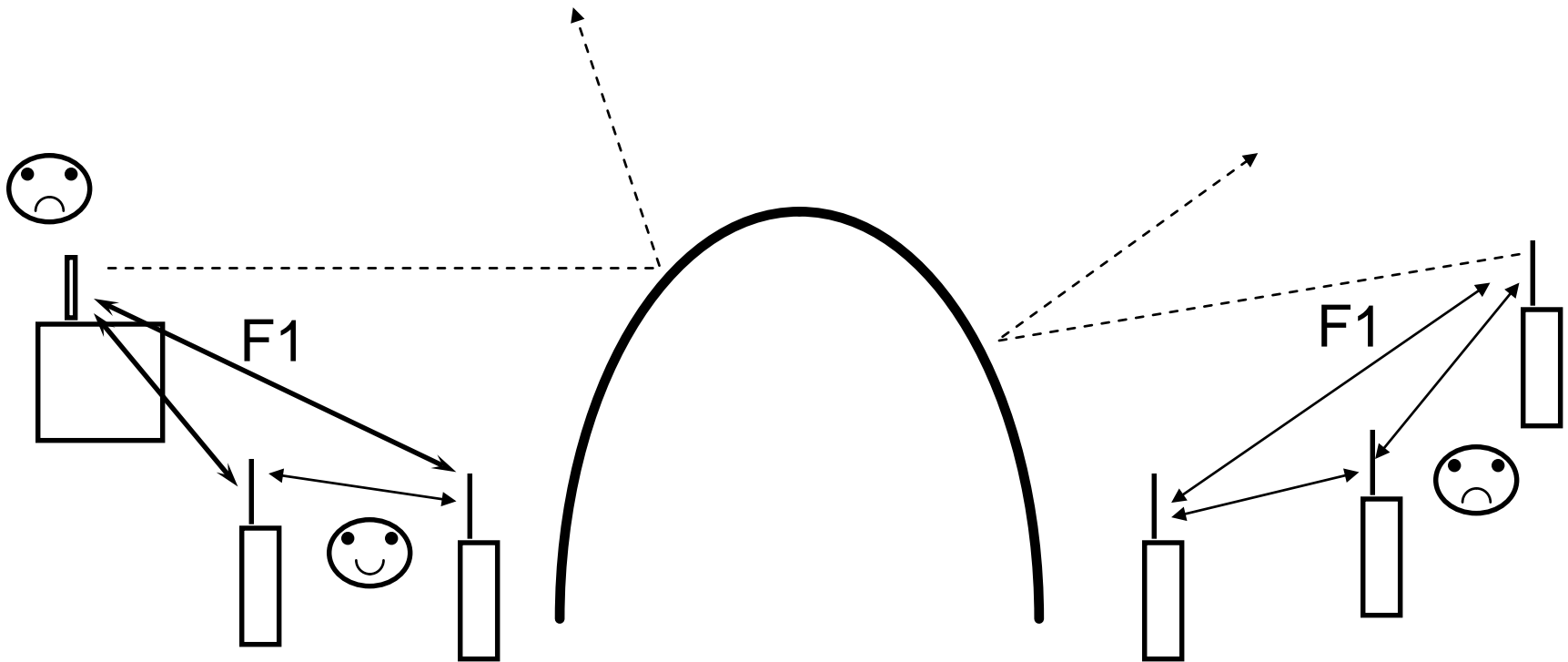


MULTIPOINT NETWORK (SIMPLEX)



ISOLATED NETS! (BAD NEWS!)

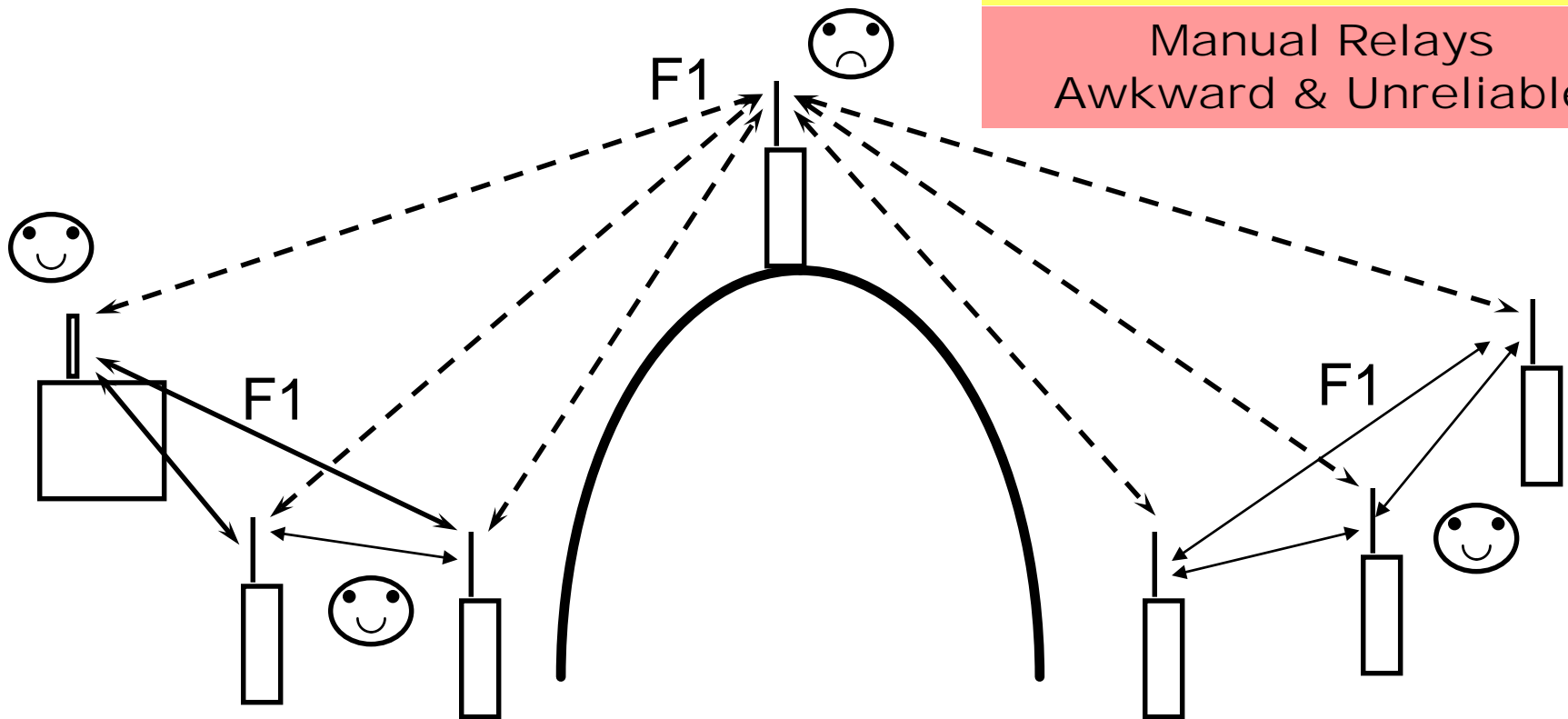
Simple Simplex Signals



MANUAL VOICE RELAY (TIME DELAY SIMPLEX)

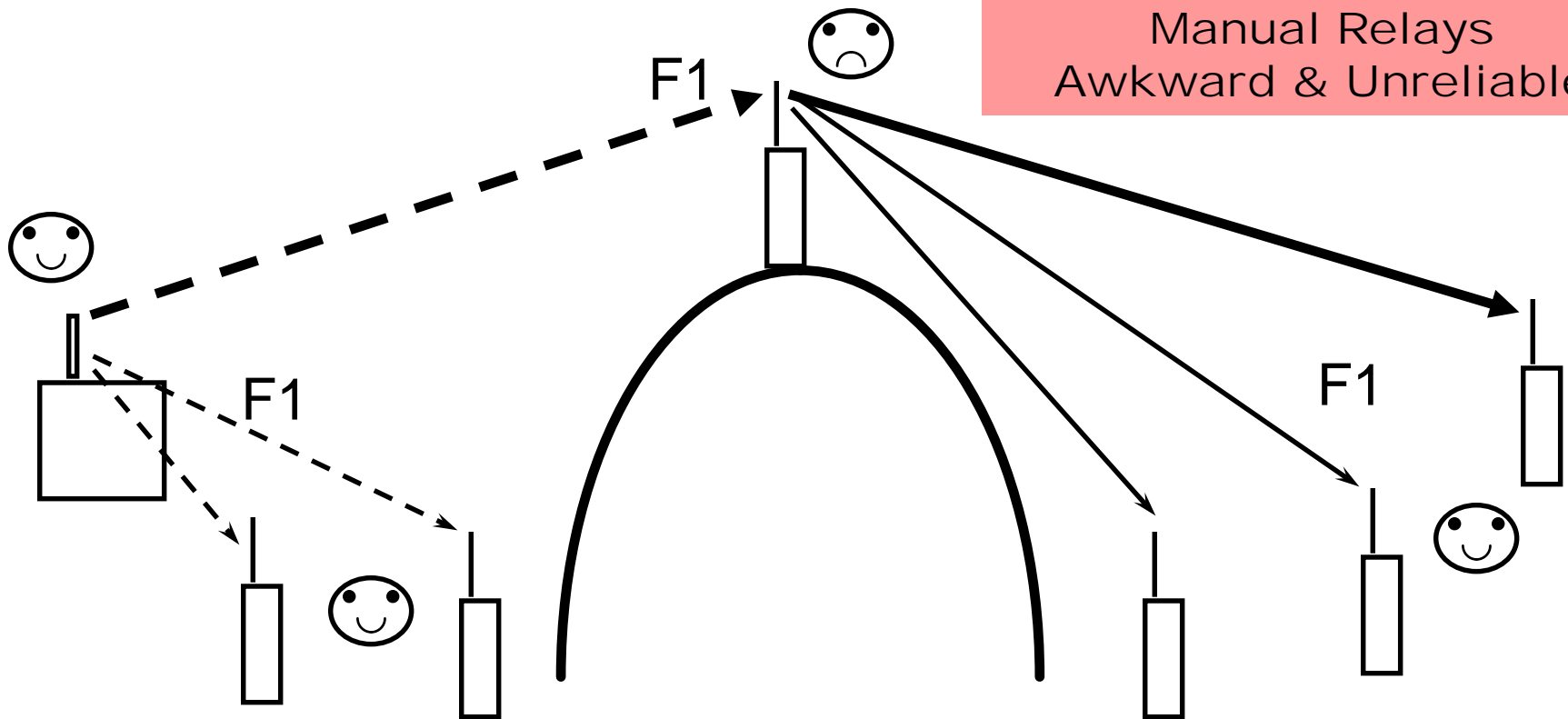
Simple Simplex Signals

Manual Relays
Awkward & Unreliable



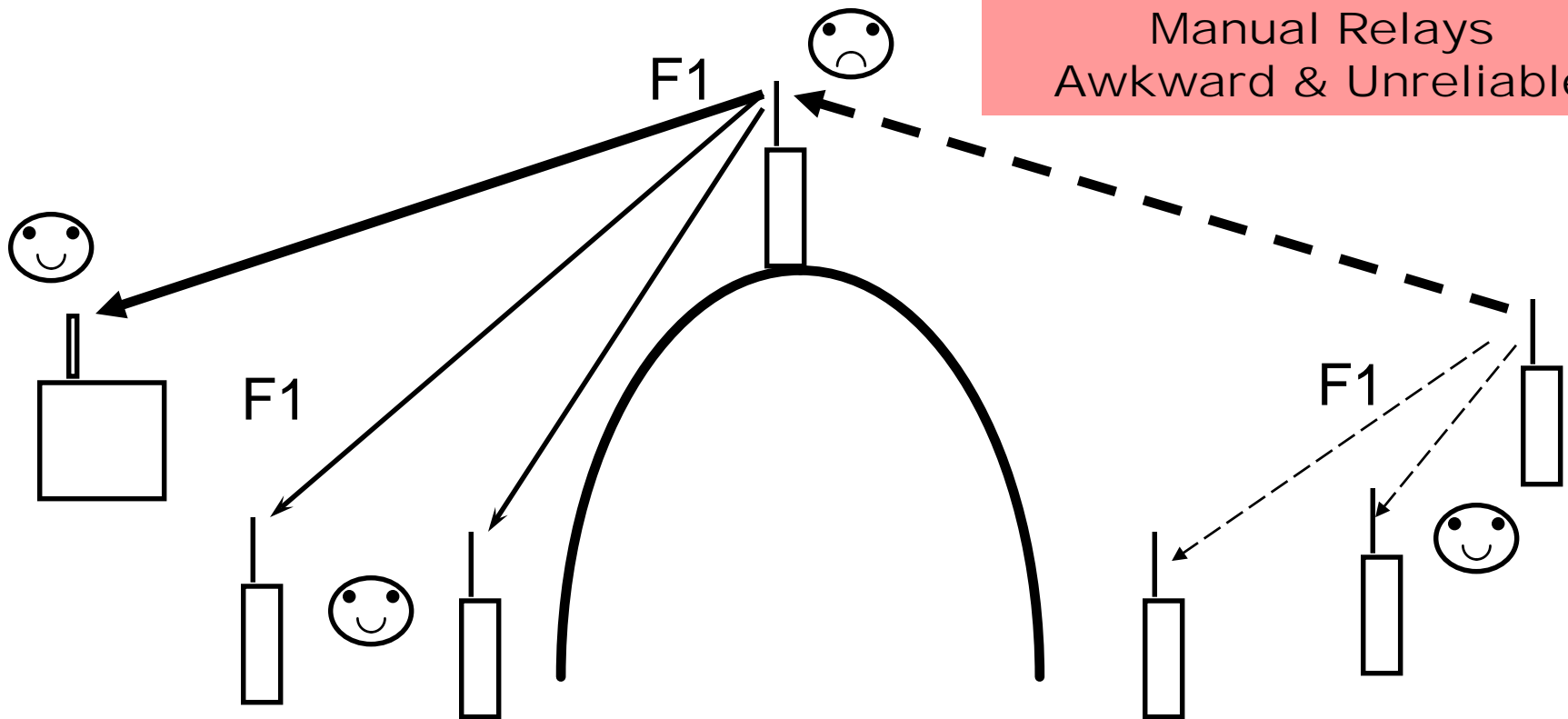
MANUAL VOICE RELAY (2-STEP BASE to FIELD)

Simple Simplex Signals
Manual Relays
Awkward & Unreliable



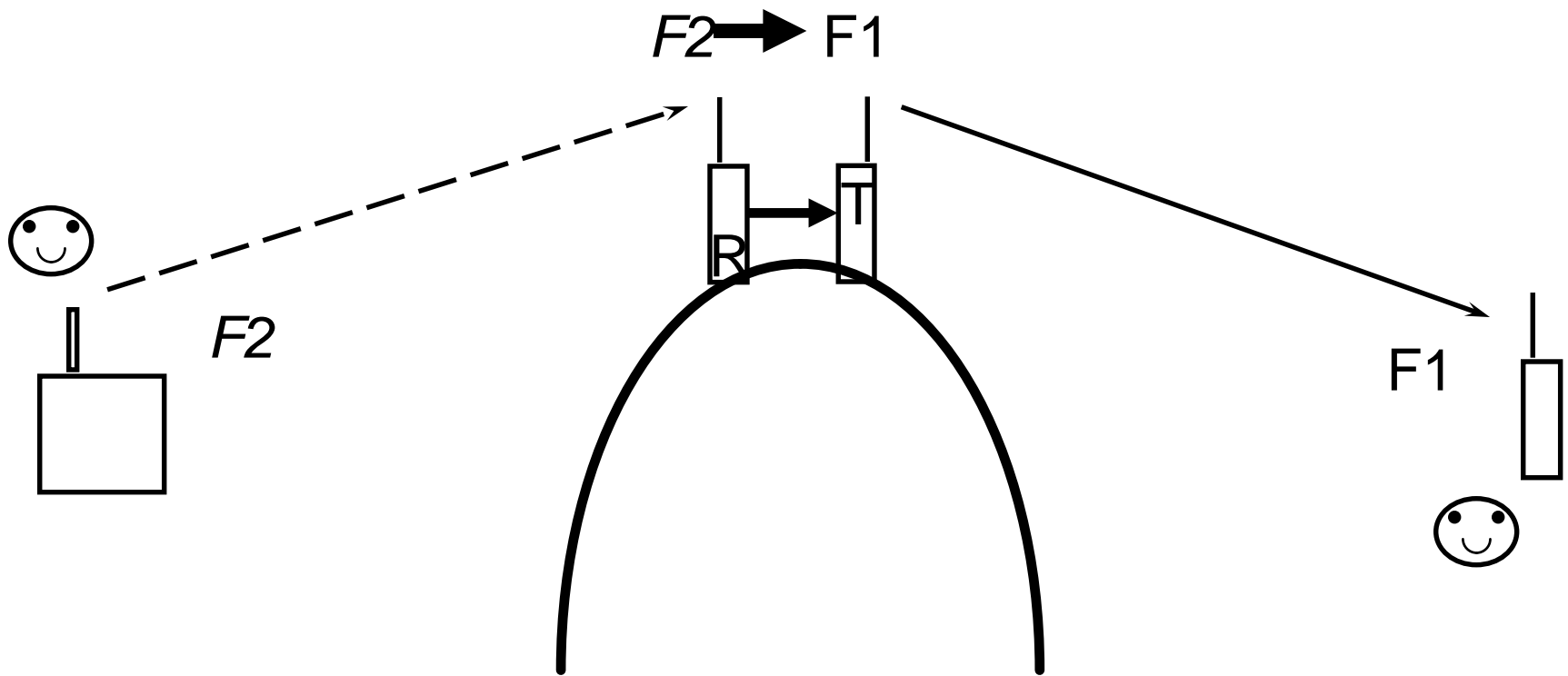
MANUAL VOICE RELAY (2-STEP FIELD to BASE)

Simple Simplex Signals
Manual Relays
Awkward & Unreliable



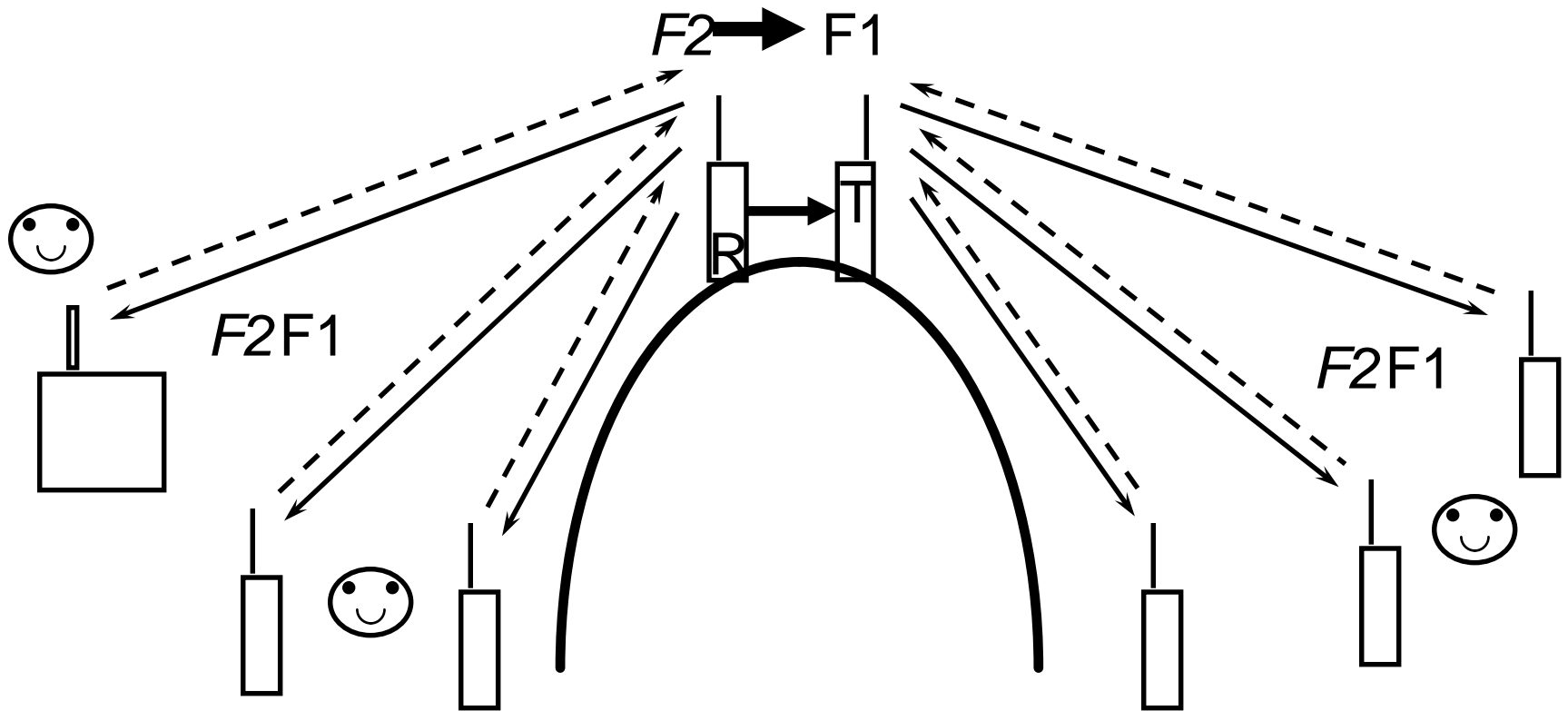
AUTOMATIC REPEATER (1-WAY DUPLEX RELAY)

BOTH Repeater & ReTrans



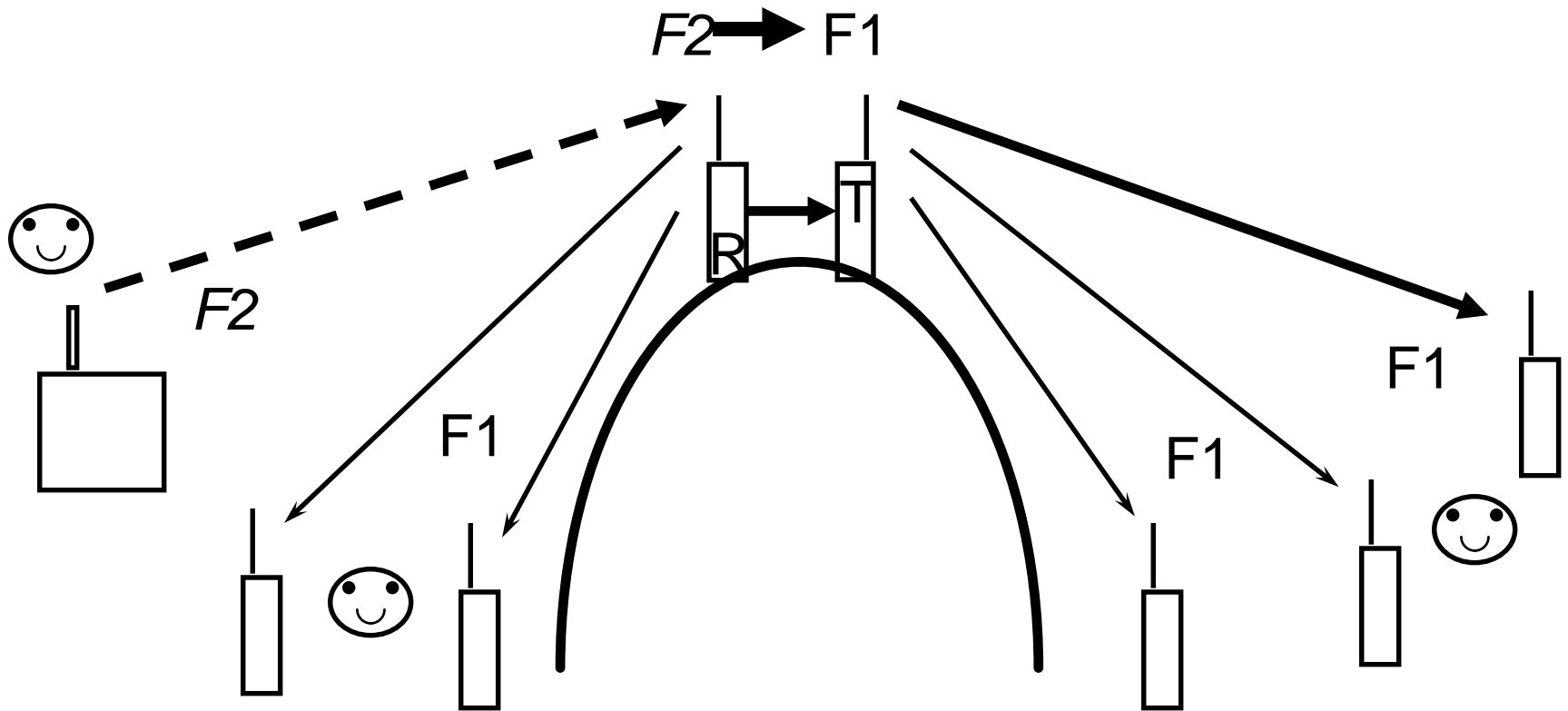
AUTOMATIC REPEATER (1-WAY DUPLEX RELAY)

BOTH Repeater & ReTrans



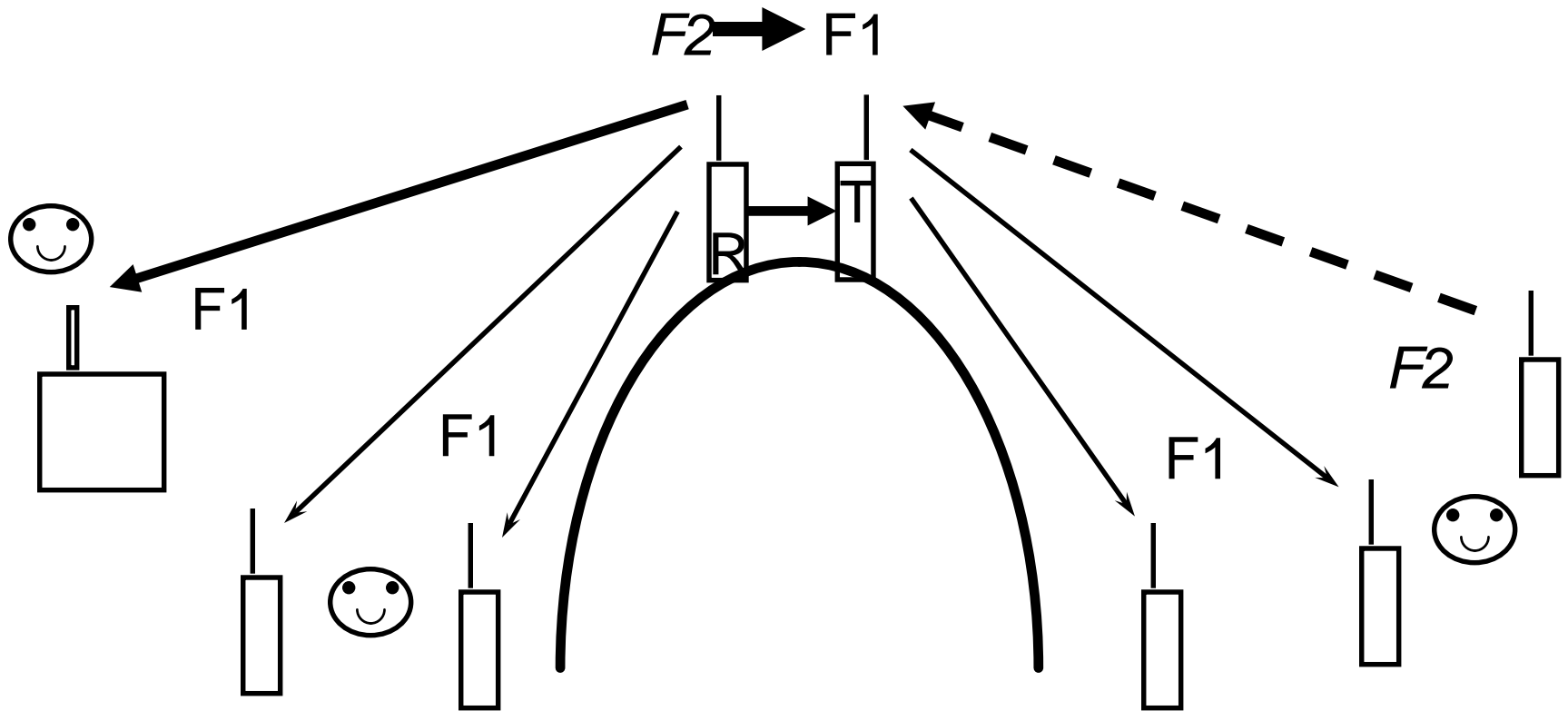
AUTOMATIC REPEATER (BASE to FIELD)

BOTH Repeater & ReTrans



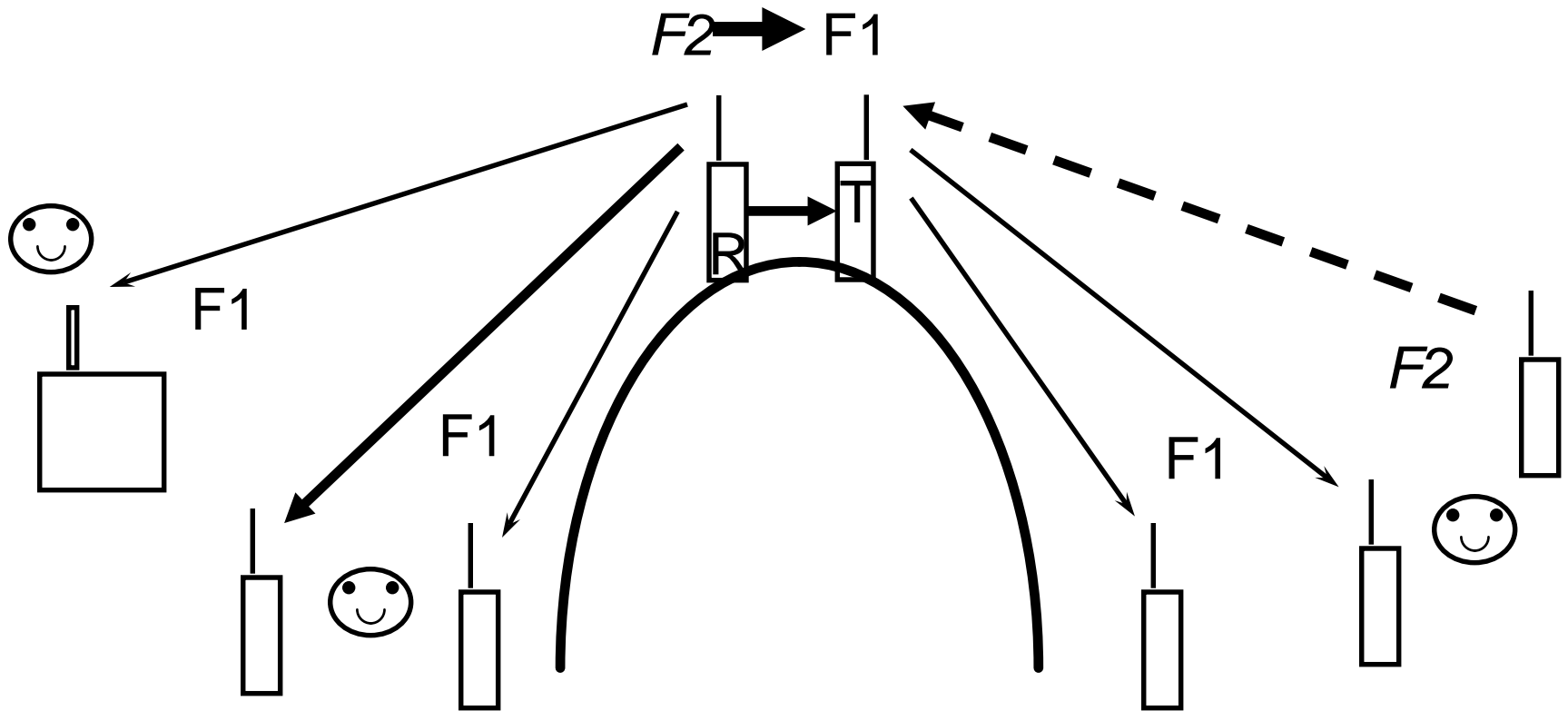
AUTOMATIC REPEATER (FIELD to BASE)

BOTH Repeater & ReTrans



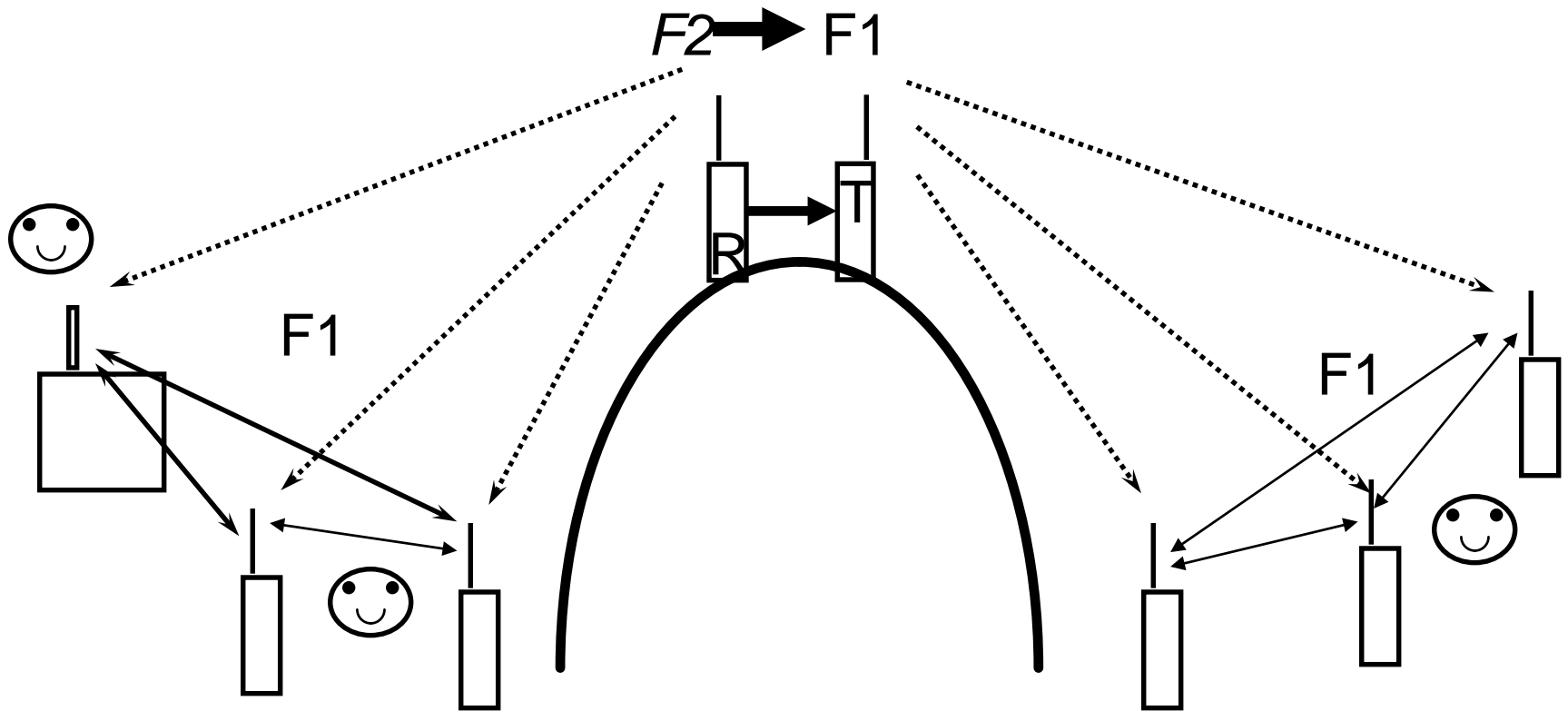
AUTOMATIC REPEATER (FIELD to FIELD)

BOTH Repeater & ReTrans



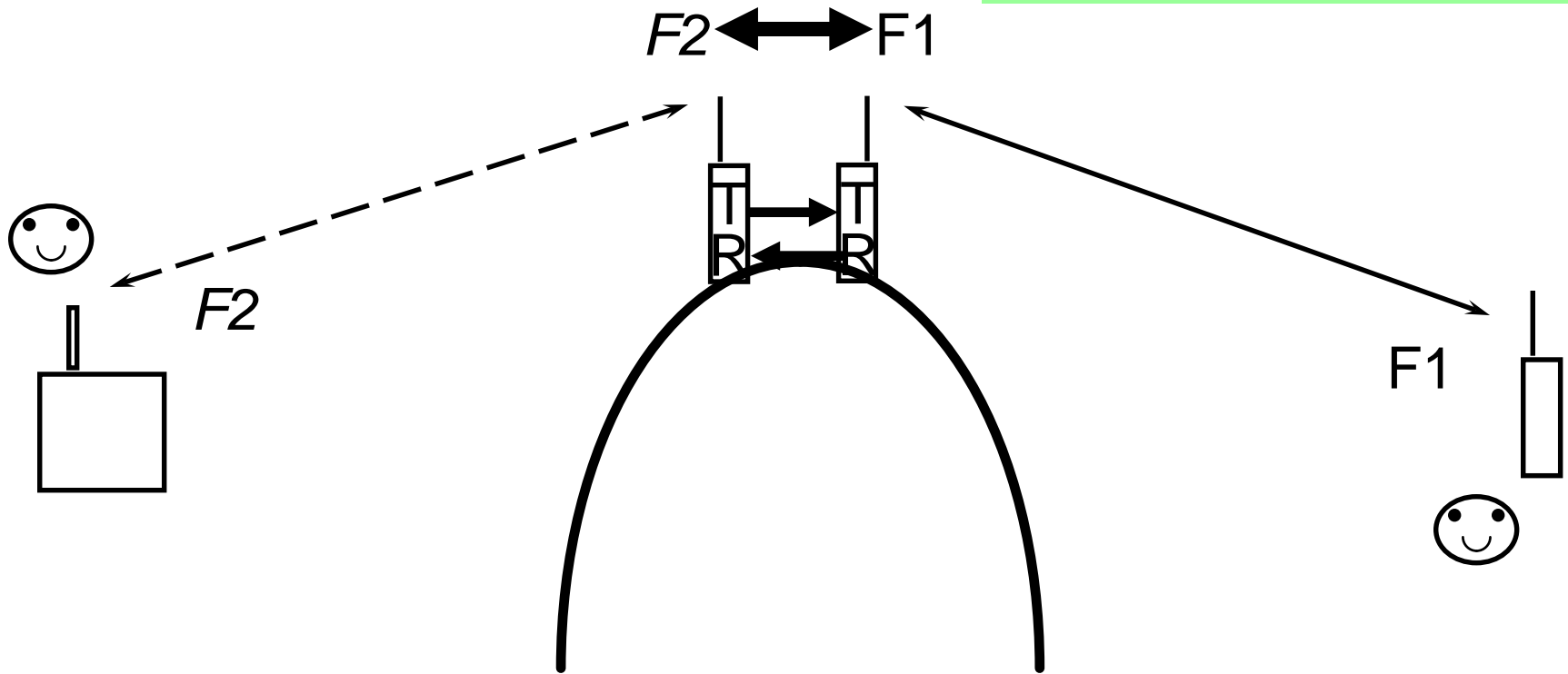
AUTOMATIC REPEATER ("TALKAROUND" CHANNEL)

BOTH Repeater & ReTrans



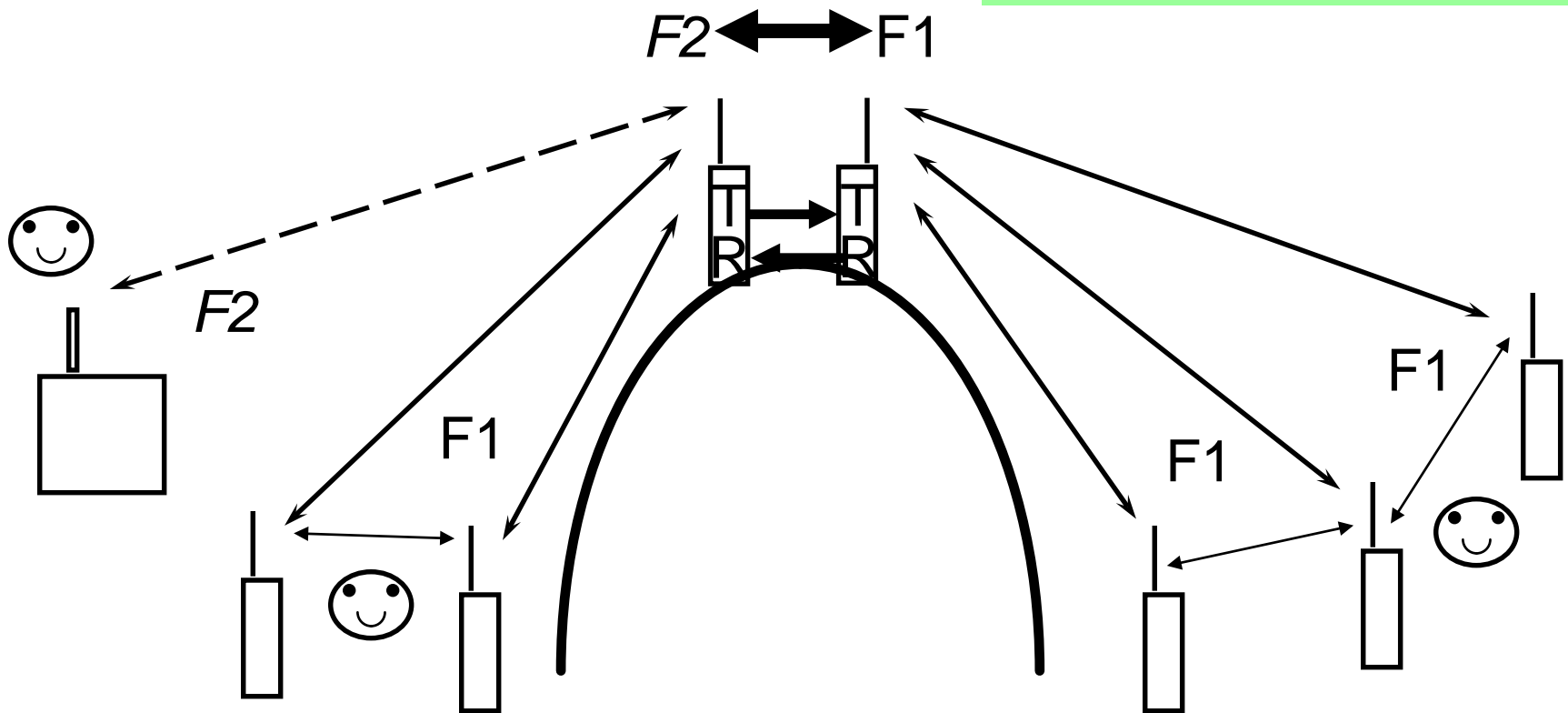
RETRANSMITTER (2-WAY DUPLEX RELAY)

ONLY ReTransmitter!



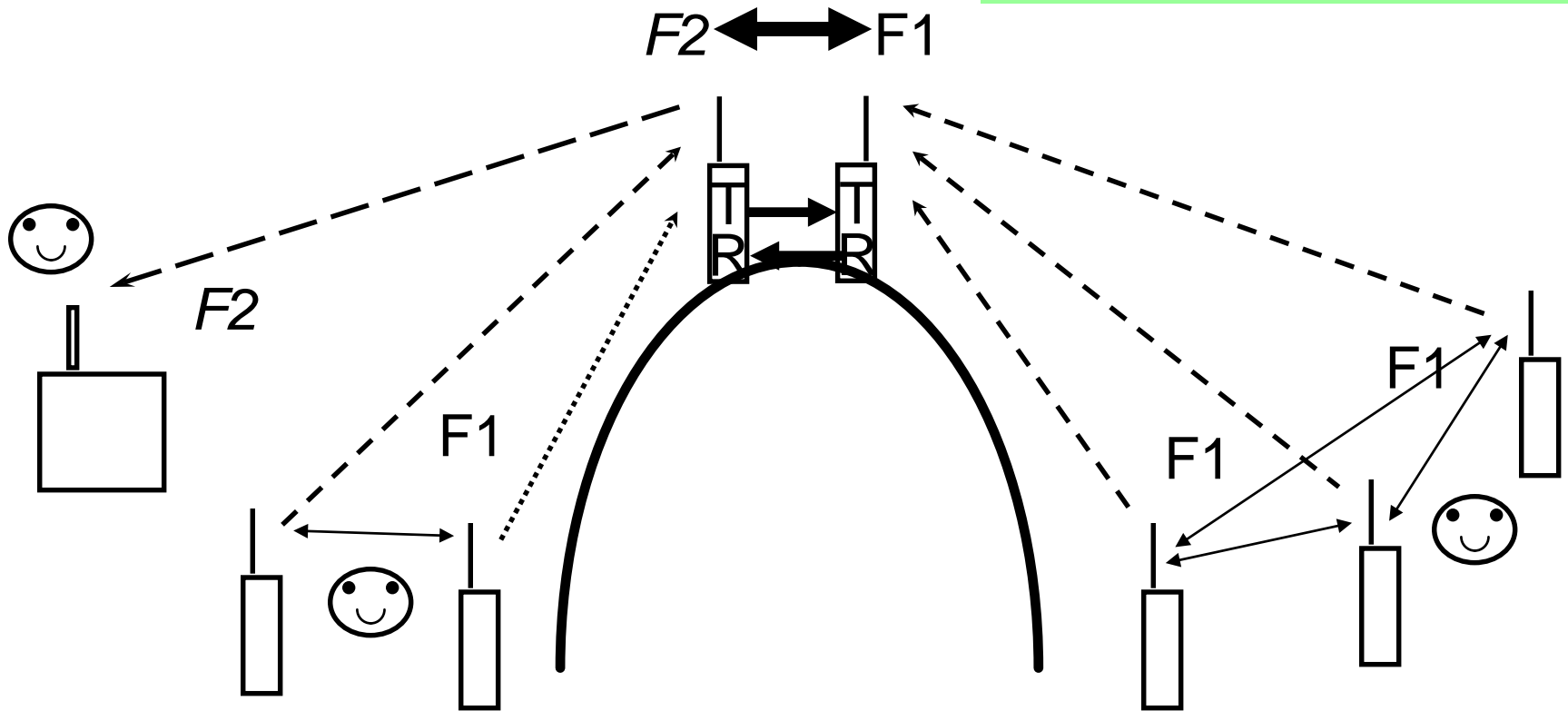
RETRANSMITTER (2-WAY DUPLEX RELAY)

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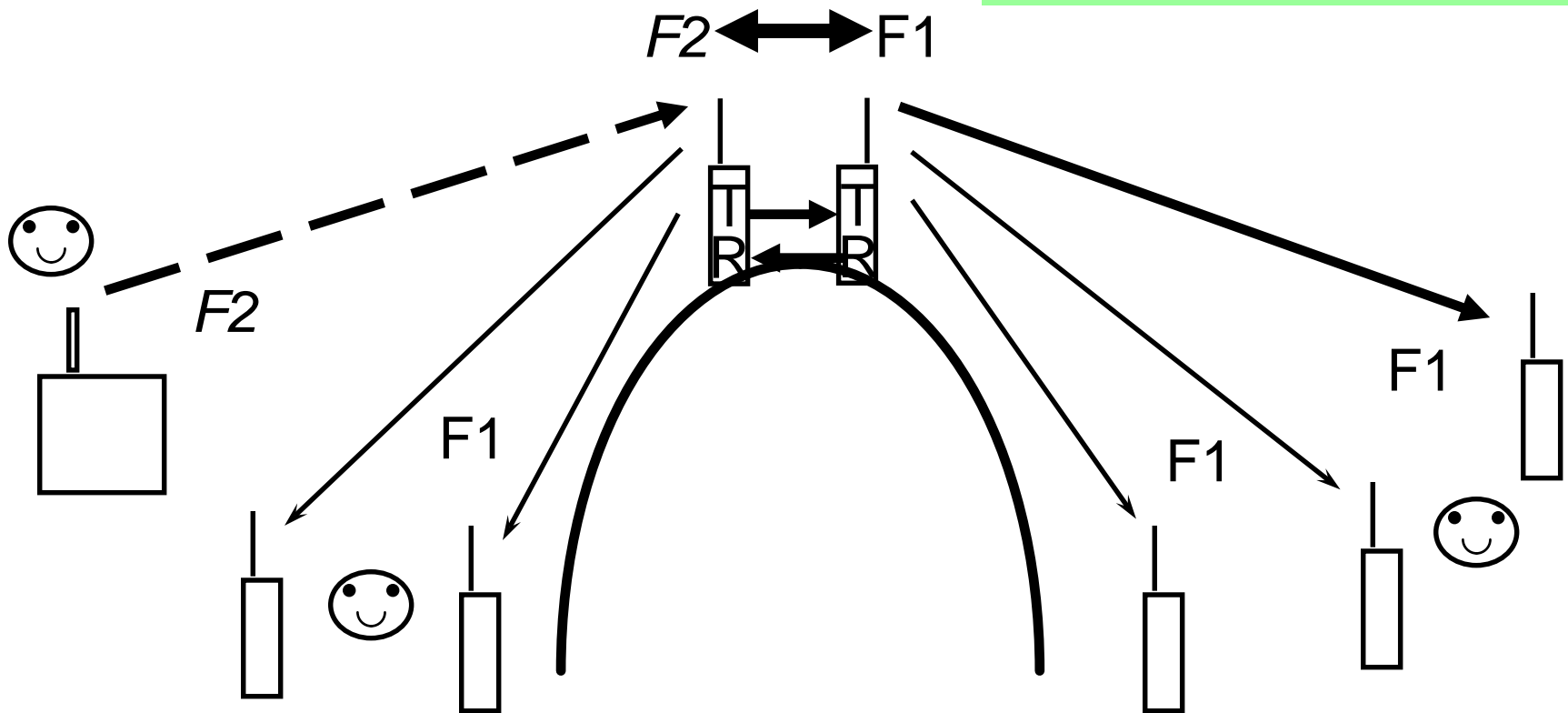
RETRANSMITTER (FREQ REUSE & MONITOR)

ONLY ReTransmitter!



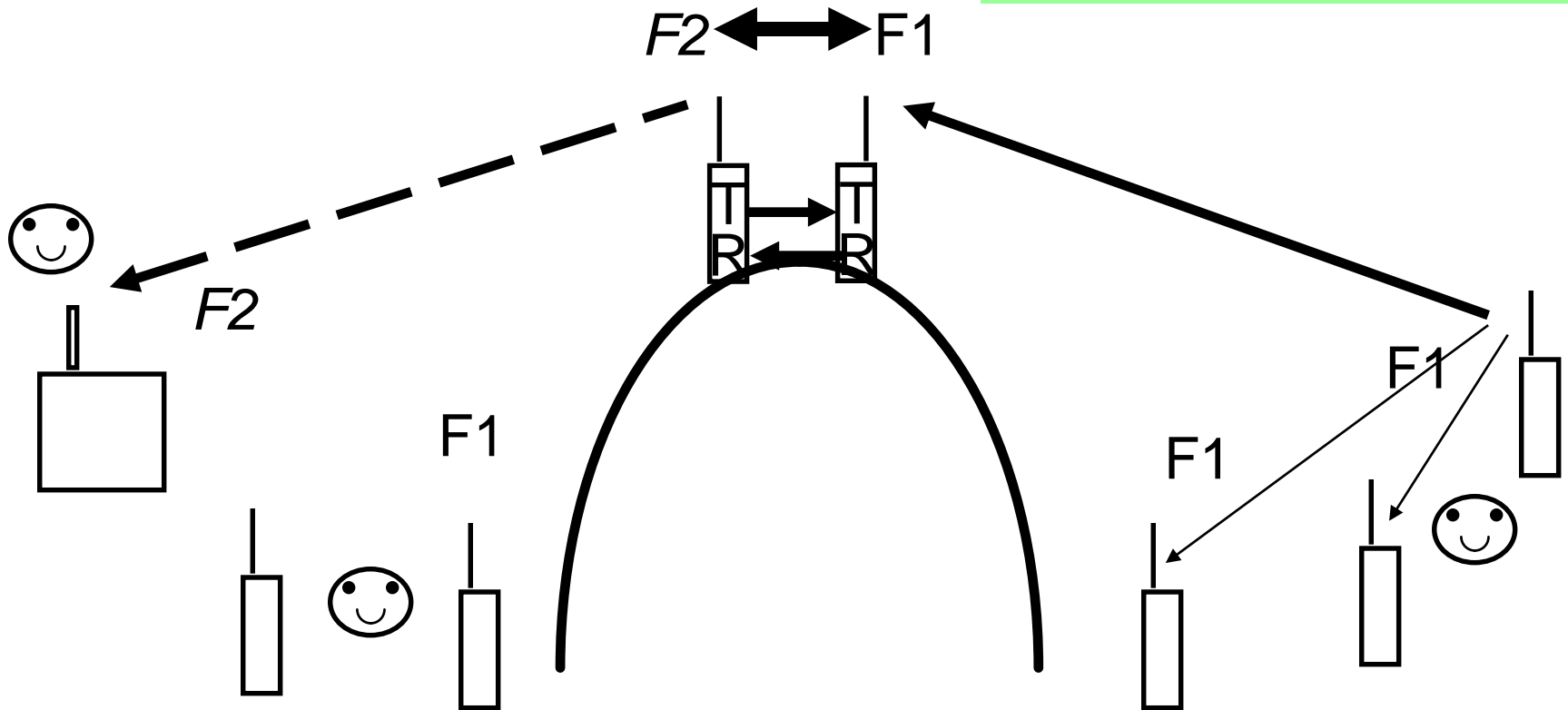
REMOTE BASE (BASE to FIELD)

ONLY ReTransmitter!



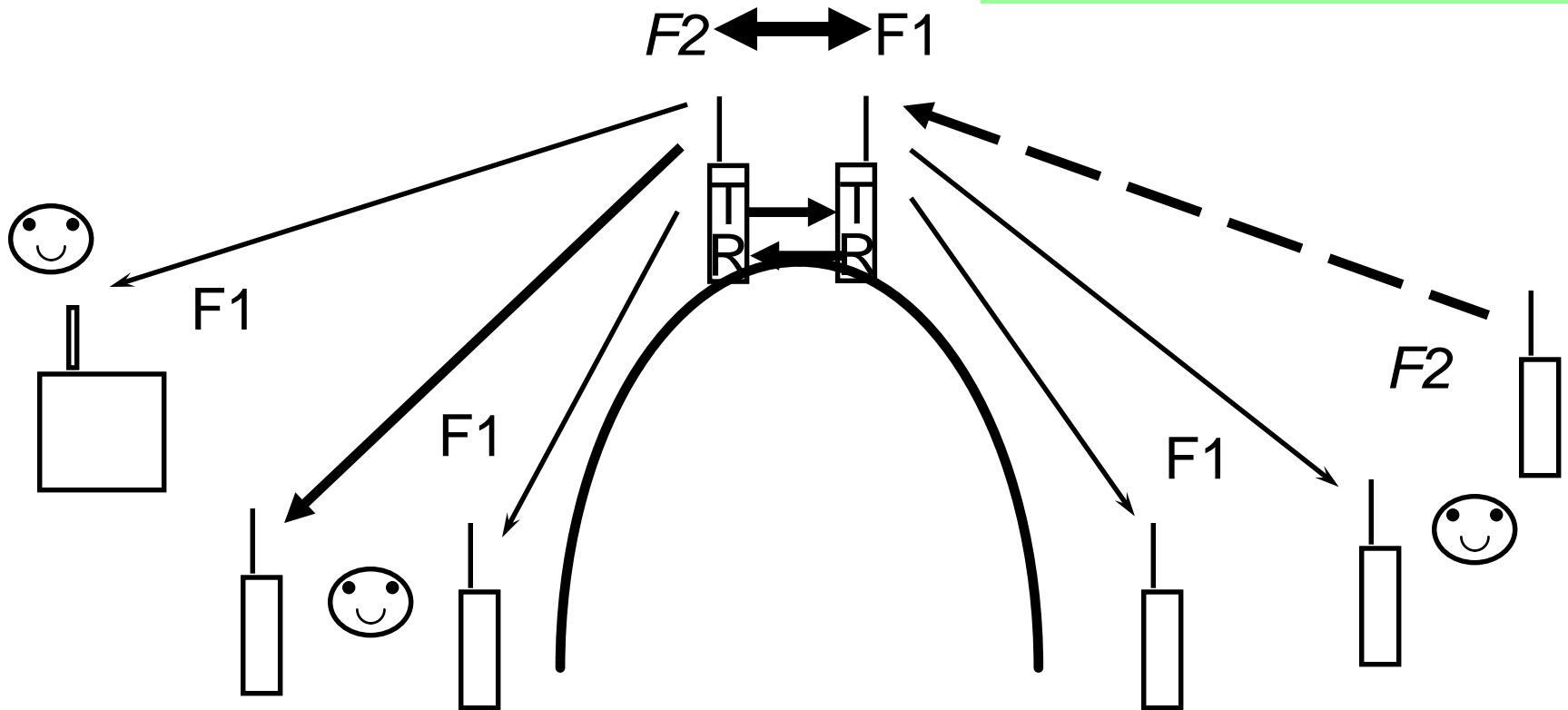
REMOTE BASE (FIELD to BASE)

ONLY ReTransmitter!



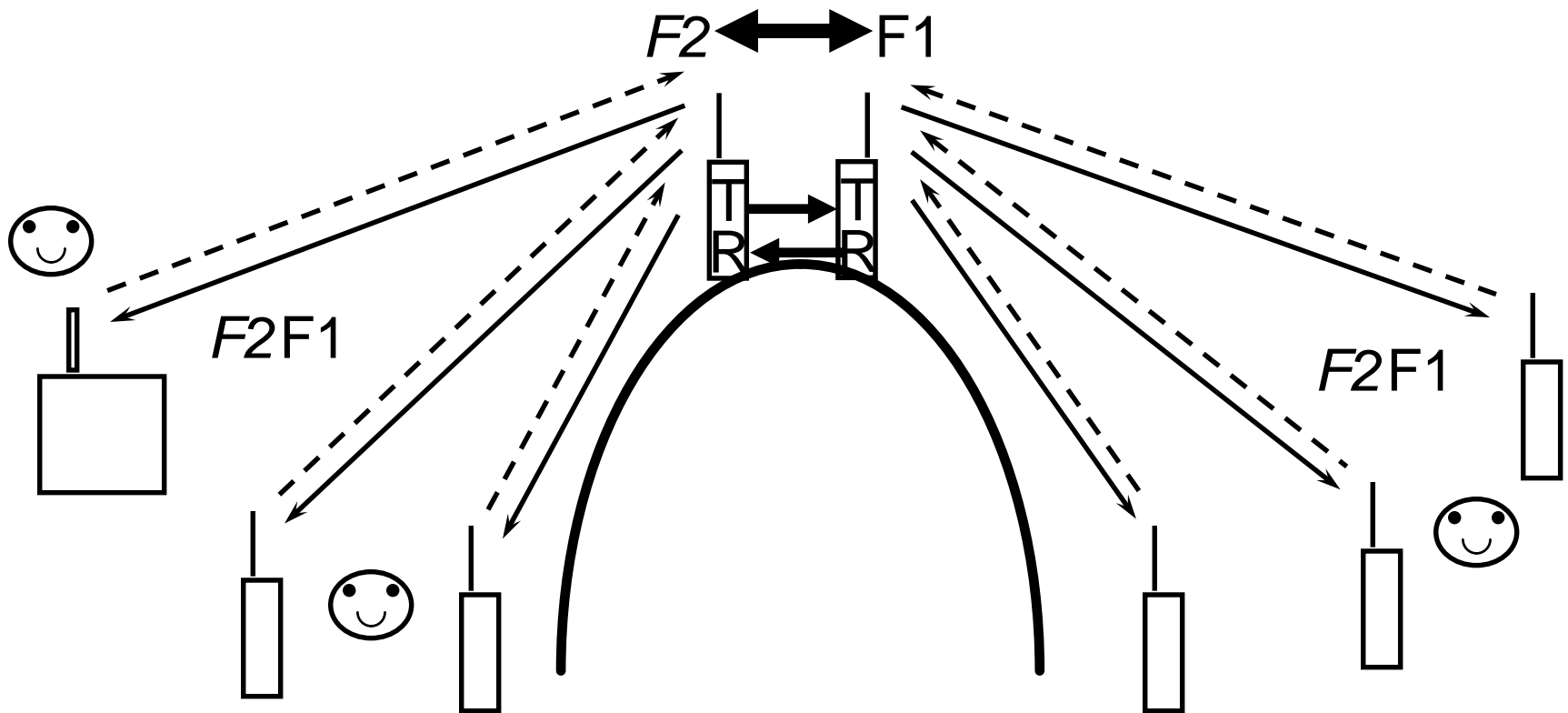
RETRANSMITTER (FIELD to FIELD)

ONLY ReTransmitter!



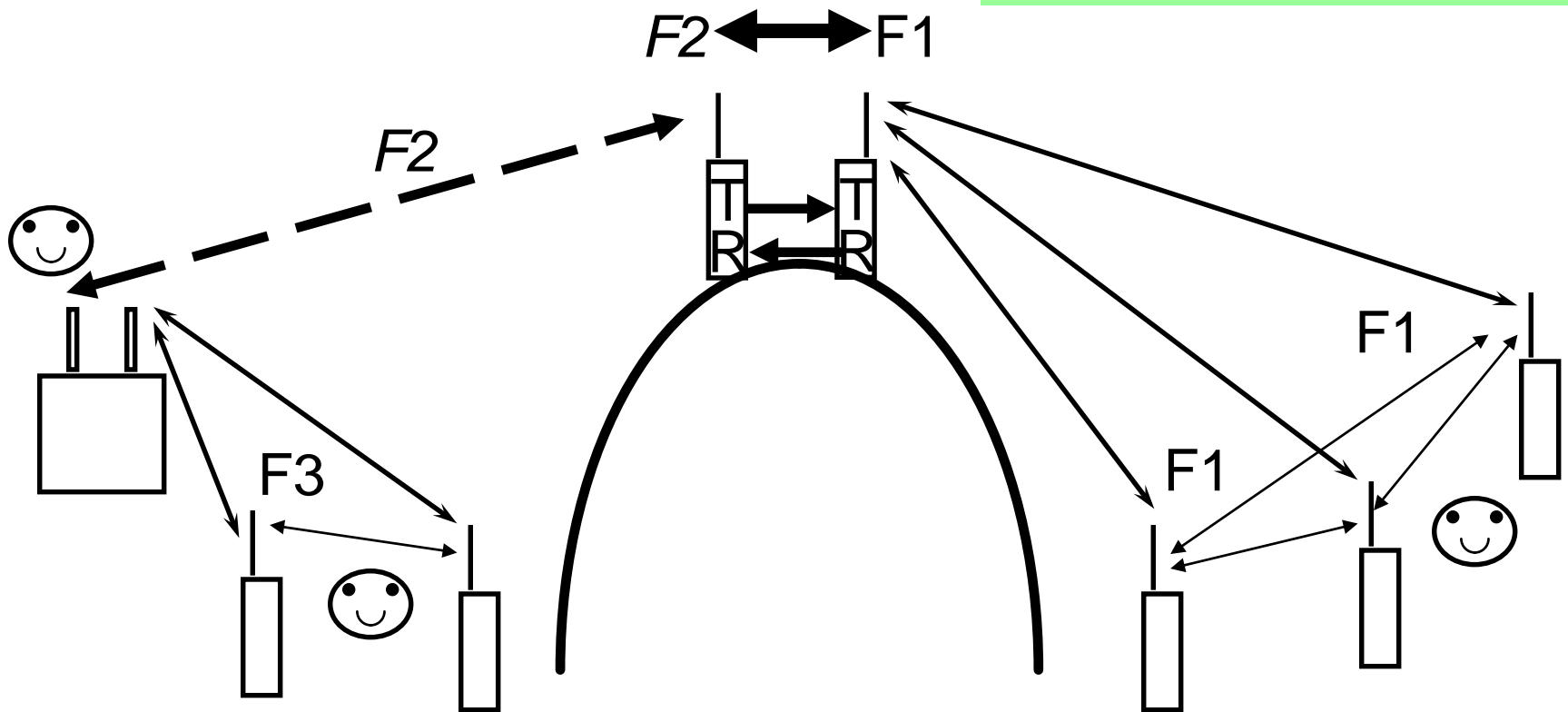
AUTOMATIC REPEATER (Using RETRANSMITTER)

BOTH Repeater & ReTrans



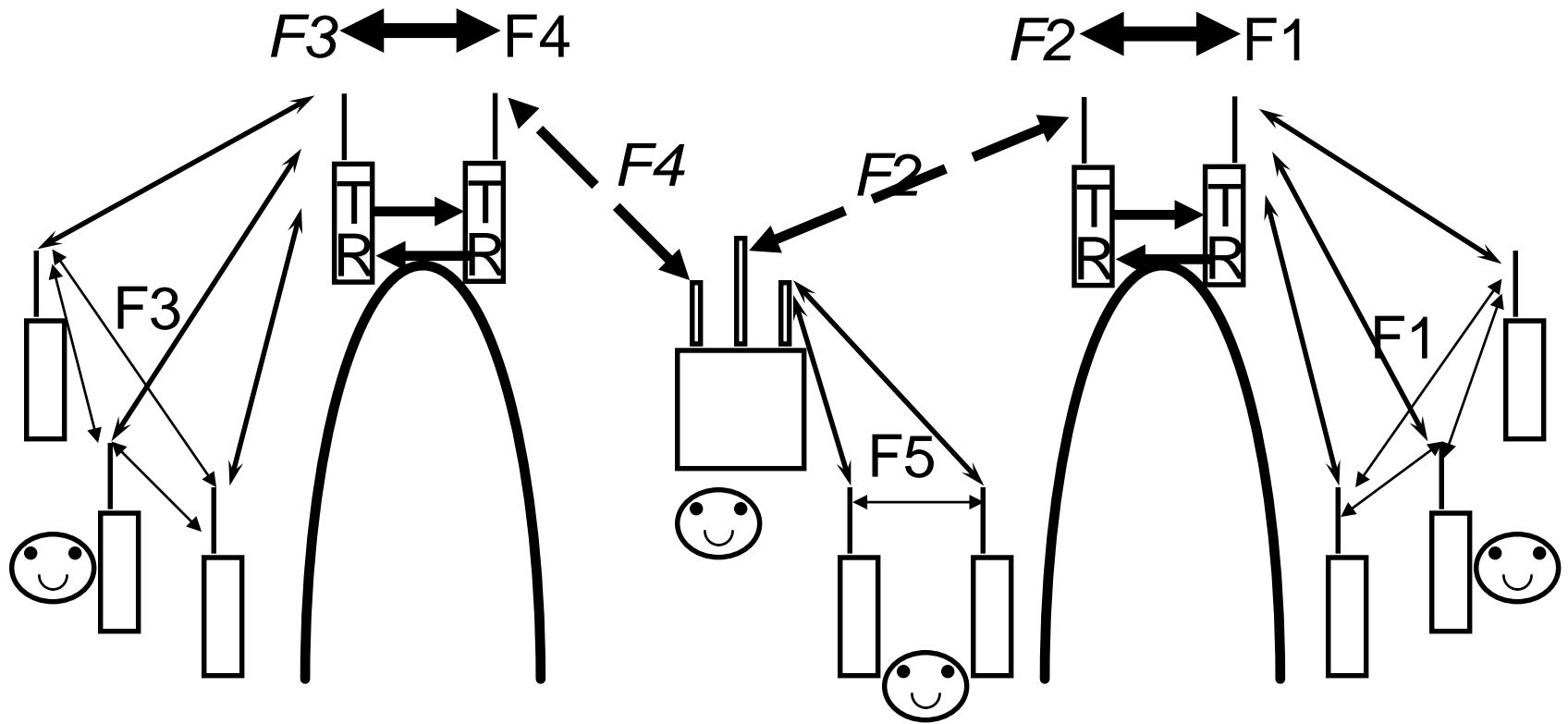
LOCAL & REMOTE BASES TYPICAL FIELD USE

ONLY ReTransmitter!

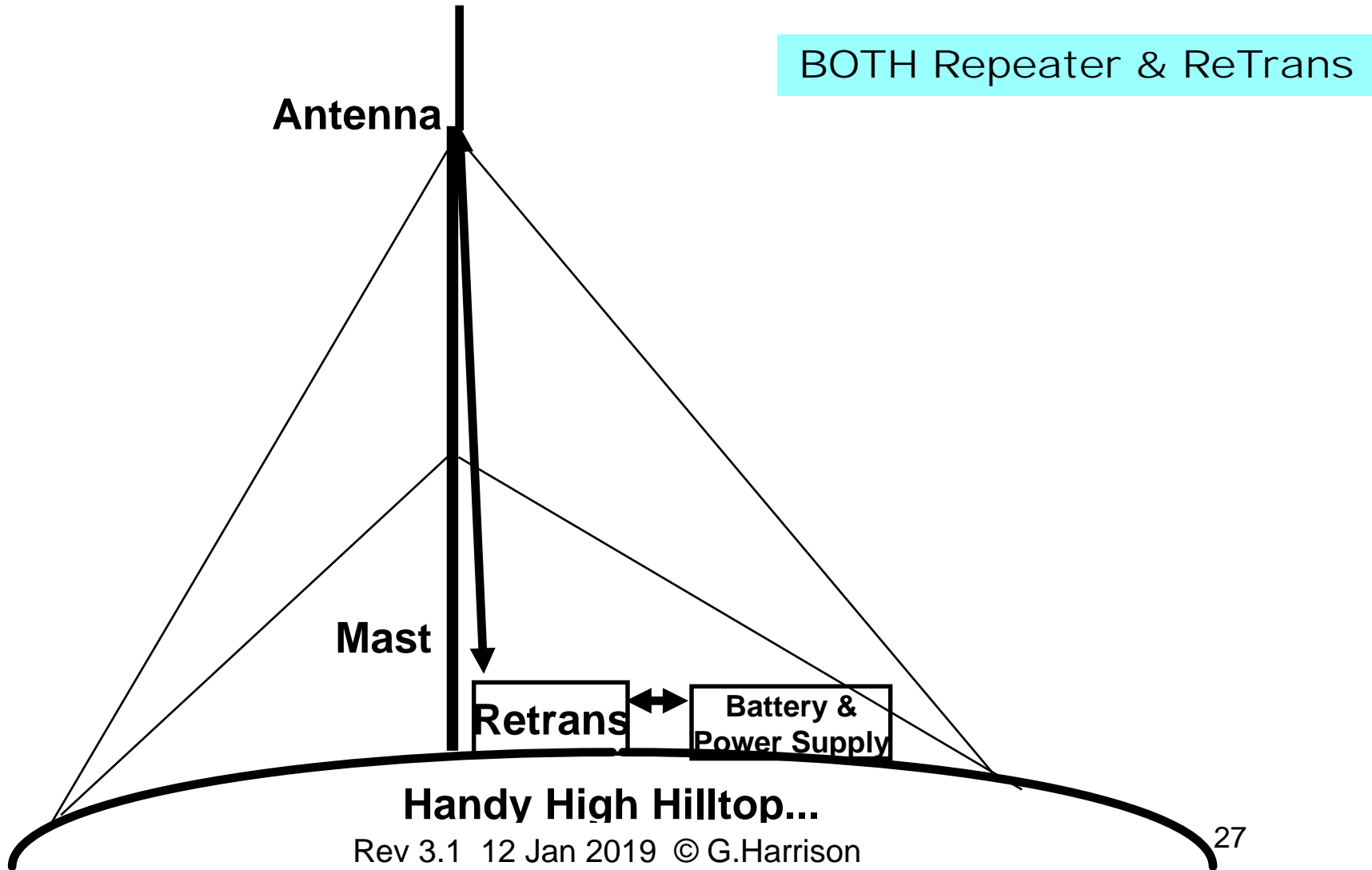


LOCAL & 2 REMOTE BASES TYPICAL FIELD USE

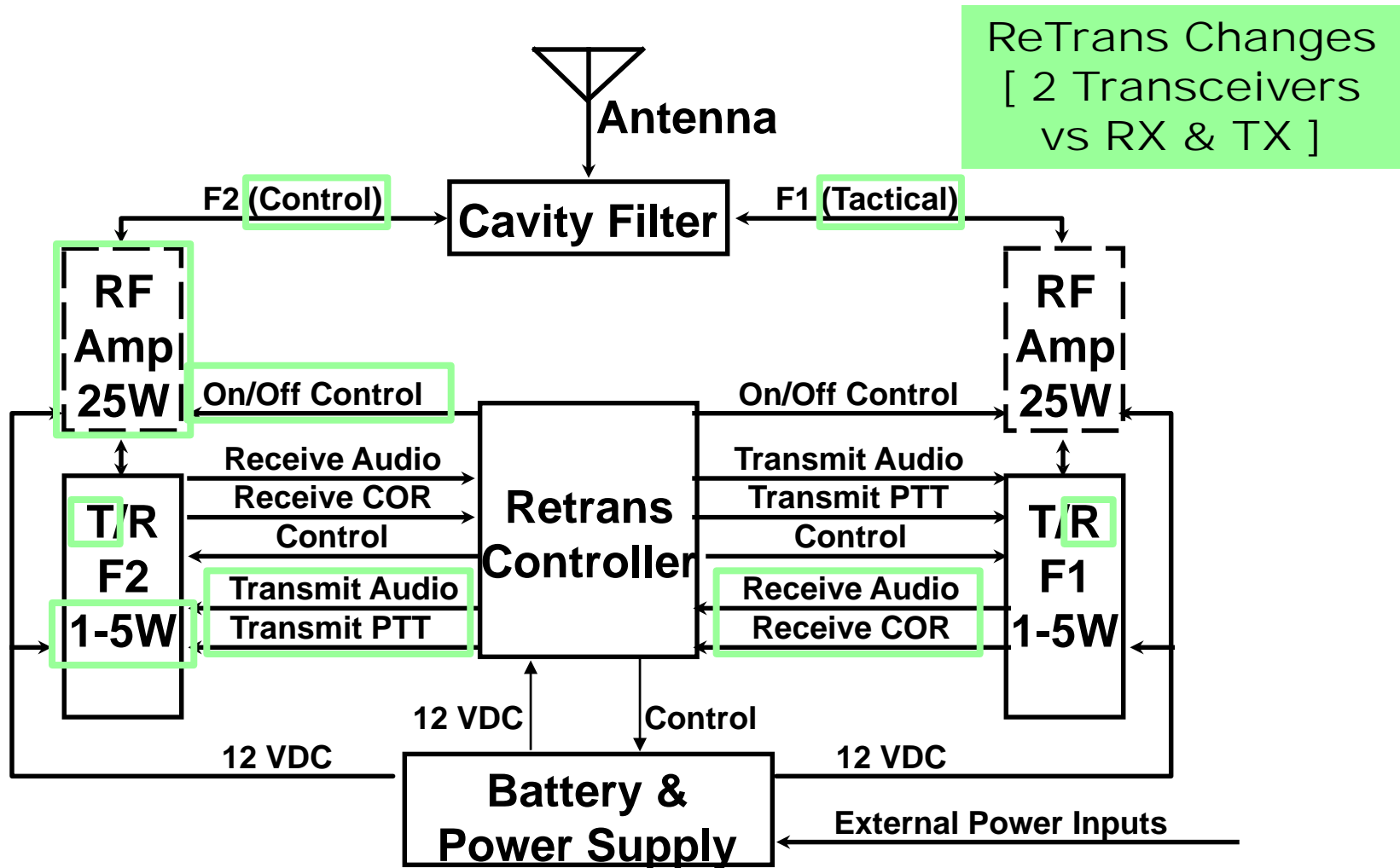
ONLY ReTransmitter!



RETRANSMITTER DEPLOYMENT



RETRANSMITTER BLOCK DIAGRAM



RETRANSMITTER COSTS

NOTE:: THIS IS A *BIG* EXAMPLE! *VERY SMALL* SYSTEMS ALSO AVAILABLE!

INDEX	QTY	QTY	DESCRIPTION	MANUFACTURE	MODEL	SOURCE	\$\$ EA	\$\$ SET	\$\$ SET
	Min	MAX						Min	MAX
1	2	2	Transceiver, VHF 5-50W	Icom	IC-5061	Ebay	400	\$800	\$800
2	2	2	Microphone, fuw Radio	Icom	(included?)	Ebay	50	\$100	\$100
3	1	1	Programming Set	Icom	TBD	Ebay	100	\$100	\$100
4	1	1	Duplexer, VHF 50W	China	TBD	Ebay	150	\$150	\$150
5	0	2	Amplifier, HD RF VHF	TBD	TBD	HRO	300	\$0	\$600
6	1	2	Repeater Controller(s)	ARCOM	AR210	ARCOM	500	\$500	\$1,000
7	1	2	Battery, Rechargeable	TBD	GelCell	Many	100	\$100	\$200
8	1	1	Power Supply, AC	TBD	TBD	HRO	150	\$150	\$150
9	0	1	Power Supply, Solar	TBD	TBD	Ebay	300	\$0	\$300
10	0	1	Power Supply, Wind	TBD	TBD	Ebay	500	\$0	\$500
11	0	2	Charge Controller(s)	TBD	TBD	Ebay	100	\$0	\$200
12	1	1	Antenna, Vertical, VHF	Diamond	X50C2N	HRO	150	\$150	\$150
13	0	1	Antenna, Directional, VHF	Cushcraft	A270-10S	HRO	180	\$0	\$180
14	1	2	Mast Set, 38ft	MFJ	1906HD	HRO	250	\$250	\$500
15	1	2	Tripod Set, fuw Mast	MFJ	1921	HRO	180	\$180	\$360
16	1	2	Cable, Coaxial RF, 100ft	ABR	9913 Flex	HRO	150	\$150	\$300
17	1	2	Protection, Coax	TransTector	TBD	HRO	50	\$50	\$100
18	1	2	Protection, Grounding	TBD	TBD	HRO	50	\$50	\$100
19	1	1	Case, Deployment	Pelican	TBD	Ebay	300	\$300	\$300
20								\$0	\$0
TOTALS	16	30						\$3,030	\$6,090
	NOTES::		INPUT VARIABLES	INFORMATION	OUTPUTS				
	NOTES::		Preliminary Prices 2016 – Needs Update!						

SUMMARY

- **RELAYS, INCLUDING REPEATERS & RETRANSMITTERS**
 - PROVIDE LONGER RANGES & WIDER COVERAGE AREAS
 - CONNECT FORMERLY *REMOTE OR ISOLATED* USERS & NETS
 - ENHANCE *INTEROPERABILITY*
 - SEEM SIMILAR, AND *ALL ARE NEEDED*
- **AUTOMATIC SYSTEMS ARE SUPERIOR TO MANUAL RELAYS**
- **RETRANSMITTERS ALWAYS**

QUESTIONS??

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